

IDAHO DEPARTMENT OF FISH AND GAME

Jerry M. Conley, Director

FEDERAL AID IN FISH RESTORATION

1992 Job Performance Report

Project F-71-R-17



REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS

Job No. 1-a.	Region 1 Mountain Lakes Investigations
Job No. 1-b'.	Region 1 Lowland Lakes Investigation
Job No. 1-b ² .	Region 1 Lowland Lakes Investigations: Coeur d'Alene Lake Investigations
Job No. 1-c'.	Region 1 Rivers and Streams Investigations
Job No. 1-c ² .	Region 1 Rivers and Streams Investigations: Coeur d'Alene River Put-and-Take Rainbow Evaluation
Job No. 1-d.	Region 1 Technical Guidance

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JOB PERFORMANCE REPORT

State of: Idaho

Name: Regional Fishery Management
Investigations

Project No: F-71-R-17

Title: Region 1 Mountain Lakes
Investigations

Job: 1-a

Period Covered: July 1, 1992 to June 30, 1993

ABSTRACT

Anglers fished for 3,147 h (768 h/ha), caught 4,137 fish (1,009 fish/ha), and the return-to-the-creel for put-and-take rainbow was 60% on lower Glidden Lake. Anglers fished for 9,941 h (1,212 h/ha), caught 8,935 fish (1,090 fish/ha), and the return-to-the-creel for put-and-take rainbow trout Oncorhynchus mykiss was 125% on Lake Elsie. Each of the six lakes surveyed had stunted populations of brook trout. Coefficients of condition (K_{TL}) ranged from 0.41 to 1.2.

Hatchery personnel and volunteers stocked 37 mountain lakes in Region 1. Species stocked included westslope cutthroat trout *O. clarki lewisi*, Kamloops, Mt. Lassen and Hayspur strains of rainbow trout, brook trout *Salvelinus fontinalis*, brown trout *Salmo trutta*, Arctic grayling *Thymallus arcticus*, and splake *S. fontinalis* x *S. namaycush*.

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INTRODUCTION

Mountain lakes provide a special type of fishing opportunity. Many fishery managers try to provide a variety of salmonid species for the angler. Often a single lake is designated for one species of fish. Ideally, a group of lakes would each contain a different salmonid species. However, this is not the case in the mountain lakes in the South Fork of the Coeur d'Alene River. The lakes in this drainage are scattered throughout the area. Two lakes are generally the maximum in a group.

In the 1930s and 1940s, these lakes were stocked with brook trout Salvelinus fontinalis. In most of these lakes, brook trout reproduced successfully, eventually becoming overpopulated resulting in "stunted" populations of brook trout.

Public meetings were held to decide how to "improve" the brook trout fisheries in the mountain lakes. Participants agreed with Department biologists to stock a predator, bull trout Salvelinus confluentus, to control brook trout populations. Three lakes were selected; Upper Glidden, Upper Stevens, and Revett lakes (Figure 1). The bull trout will be stocked in 1993. In 1992, baseline surveys were conducted to determine the coefficient of condition for the brook trout.

Two other mountain lakes, Lake Elsie and Lower Glidden Lake (Figure 1), contained stunted populations of brook trout. They also received put-and-take rainbow trout Oncorhynchus mykiss. Volunteers conducted creel surveys to determine the harvest of brook trout and put-and-take rainbow trout.

The Roman Nose Lake system consists of a series of three glacial cirque lakes located in the Selkirk Mountains, approximately 18 km west and south of Bonners Ferry, Idaho. The Roman Nose lakes contribute to the headwaters of Caribou Creek which flows into Deep Creek, a tributary of the Kootenai River. The lower lake (in the southern drainage), Roman Nose #3, is accessible by road and is stocked annually with Kamloops rainbow or westslope cutthroat trout O. clarki lewisi fry. Roman Nose Lake #1 (the upper lake in the north drainage) and Roman Nose Lake #2 (the lower lake in the north drainage) are accessible by trail only. All three lakes receive moderate to light fishing pressure.

OBJECTIVES

1. To develop improved management plans for fish populations in mountain lakes in Region 1.
2. To evaluate limnological conditions in selected mountain lakes, their fish populations, angler satisfaction, and preferences. Use new and existing information on angler use, water quality, species history, spawning potential, stocking success, and lake morphology to develop the potential of these waters for providing diverse angling experiences.

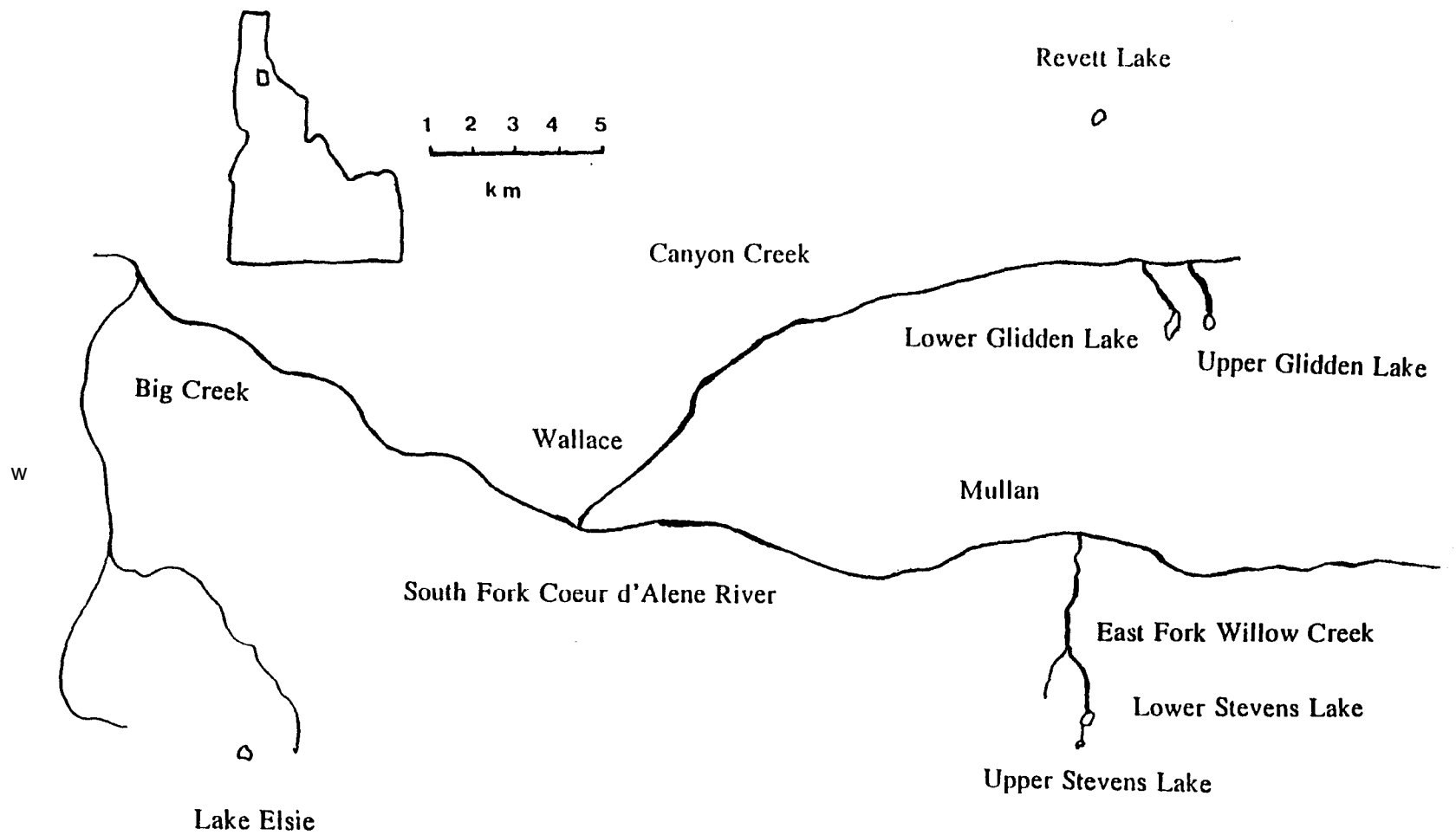


Figure 1. Mountain lakes in the South Fork Coeur d'Alene River drainage.

METHODS

Creel Survey

The volunteers conducted the creel surveys from June 1 through August 31, 1992 on Lake Elsie and Lower Glidden Lake. The creel schedule was divided into three intervals; June, July, and August. The days were divided into two periods; 0800-1400 h and 1400-2100 h. Volunteers surveyed each lake four weekday periods (two full days) and two weekend day periods (one full day) per interval. Instantaneous angler counts were made two to three times per period. All anglers leaving the lake were interviewed. Data collected included number of anglers, total hours fished, total fish caught (kept and released), and the number of brook trout and rainbow trout harvested. Biologists used a computer program to summarize and to estimate fishing effort, harvest, and catch rates.

Population Survey

Technicians set two or four experimental gill nets on Upper and Lower Stevens, Upper and Lower Glidden, Revett, Roman Nose #1 and #2 lakes, and Lake Elsie to collect brook trout. Floating and sinking monofilament gill nets, 150 ft x 6 ft, with six panels composed of 3/4-in, 1-in, 1 1/4-in, 1 1/2-in, 2-in, and 2 1/2-in bar mesh, were fished overnight in each lake. They recorded length (mm) and weight (g) and collected otoliths for aging. Department biologists calculated the coefficients of condition for each age group of brook trout per lake (the K_{TL} values were multiplied by a factor of 10^6). Length-weight equations for the brook trout populations in each lake were also calculated.

Lake Surveys

Technicians measured and recorded physical and chemical information from Upper and Lower Stevens, Upper and Lower Glidden, Revett, Roman Nose #1 and #2 lakes, and Lake Elsie.

Roman Nose lakes #1 and #2 were surveyed on September 17 and 18, 1992, the Stevens lakes were surveyed on August 26, 1992, Revett Lake was surveyed on July 22, 1992, the Glidden lakes were surveyed on June 16, 1992, and Lake Elsie was surveyed on June 18, 1992.

Mountain Lake Stocking

Information on mountain lakes in Region 1 was reviewed with hatchery personnel and individuals from other agencies and groups to coordinate releases of fish in 1992. The stocking program was based on previous history, reports of fishing quality, and availability of fish for release in 1992.

RESULTS

Creel Survey

Anglers fished for an estimated 3,147 h (768 h/ha) and caught 4,137 fish (kept and released) (1,009 fish/ha) for a catch rate of 1.3 fish/h in Lower Glidden Lake (Table 1). Anglers caught 2,120 (+ /- 1,477) put-and-take rainbow trout from Lower Glidden Lake in 1992. Return-to-the-creel of put-and-take rainbow was 60% (confidence interval [C.I.] at 95%, 18-102%).

In Lake Elsie, anglers fished for an estimated 9,941 h (1,212 h/ha) and caught 8,935 fish (1,090 fish/ha) for a catch rate of 0.9 fish/h (Table 1). Anglers caught 5,013 (+ /- 3,698) put-and-take rainbow trout from Lake Elsie in 1992. Return-to-the-creel of put-and-take rainbow trout was 125% (C.I. at 95% 32.9-217%).

Population Survey

Fish collected per hour of sampling ranged from 0.5 to 1.3 fish/h (Table 2). The brook trout length frequencies for each lake are listed in Table 2. The length-weight equations are listed in Table 3.

Ages of collected brook trout ranged from 3 to 8 years (Table 4). The oldest fish came from Lower Glidden and Revett lakes. The coefficients of condition (K_{TL}) ranged from 0.41 to 1.2 (Table 4).

Lake Surveys

Secchi depth ranged from 3 m to 12.5 m (Table 5). Maximum depth ranged from 3 m in Lower Glidden Lake to 35.2 m in Lower Stevens Lake (Table 5). Dissolved oxygen and temperature profiles are listed in Table 6.

The inlet to Roman Nose Lake #1 consists of a waterfall stream flowing through large rocks with an average width of less than 1 m and a depth of between 15 cm and 60 cm. This inlet offered no spawning habitat. The outlet flows through a short marsh reach then into an area of log jams down to Roman Nose Lake #2, approximately 0.4 km. The outlet stream offered approximately 100 m of spawning habitat.

The inlet to Roman Nose #2 consists of a steep waterfall which cascades over large boulders then flows through a small meadow area before entering the lake. Mean depth of the inlet stream was less than 0.2 m with a maximum width of 3 m. No spawning habitat existed in the inlet stream. The outlet stream of Roman Nose Lake #2 offered approximately 40 m of spawning habitat immediately downstream from the lake.

Table 1. Estimates of angler effort, harvest, and percentage of put-and-take rainbow trout returned to the creel for Lake Elsie and Lower Glidden Lake, Idaho, 1992. (95% C.I.)

Lake	Total hours fished	Hours/ ha	Number fish kept	Number fish released	Total fish caught	Number HRBT ^a kept	Number brook trout kept	Number HRBT stocked	% return- to-the-creel of HRBT
Lower Glidden	3,147 (1,922)	768	2,392 (1,666)	1,744 (1,259)	4,137 (2,778)	2,120 (1,477)	274 (262)	3,033	60%
Lake Elsie	9,941 (3,693)	1,212	5,442 (3,761)	3,489 (2,182)	8,935 (4,911)	5,013 (3,698)	430 (344)	4,010	125%

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Table 2. Summary of fish population sampling effort in eight mountain lakes in north Idaho, 1992.

Lake	Number of gill nets set	Total hours fished	Number of fish/h	Number of brook trout	Length mean	Number of rainbow trout
Elsie	4	64	1.1	42	170-260	26
Lower Glidden	4	74	1.0	57	160-290	17
Upper Glidden	4	92	0.5	48	160-220	
Revett	4	80	1.0	82	150-240	
Lower Stevens	2	36	1.2	43	170-210	
Upper Steven	2	36	1.2	43	170-240	
Roman Nose #1	2	30	1.3	23	170-230	
Roman Nose #2	2	36	1.1	40	160-230	

SEC1A

Table 3. Length-weight equations for brook trout from eight mountain lakes in north Idaho, 1992.

Lake	Length-Weight equation
Elsie	$\text{Log } W = -6.1025 + 3.47 \text{ Log } L$
Upper Glidden	$\text{Log } W = -2.1698 + 1.7129 \text{ Log } L$
Lower Glidden	$\text{Log } W = -5.8527 + 3.3635 \text{ Log } L$
Revett	$\text{Log } W = -7.8577 + 4.0907 \text{ Log } L$
Upper Stevens	$\text{Log } W = -5.3076 + 3.0542 \text{ Log } L$
Lower Stevens	$\text{Log } W = -7.7422 + 4.0968 \text{ Log } L$
Roman Nose #1	$\text{Log } W = -4.5801 + 2.7815 \text{ Log } L$
Roman Nose #2	$\text{Log } W = -5.1027 + 3.0349 \text{ Log } L$

SEC1A

Table 4. Coefficient of condition for age classes of brook trout from eight mountain lakes in north Idaho, 1992. ($K \times 10^6$)

Lake	Age	1	2	3	4	5	6	7	8
Elsie	N	0	0	3	3	1	1	2	0
	L			193	187	270	260	220	
	W			63	60	130	190	105	
	K			8.0	9.2	12.0	11.0	9.9	
Lower Glidden	N	0	0	4	2	5	0	0	1
	L			175	190	202			290
	W			50	65	86			300
	K			9.3	9.5	10.0			12.0
Upper Glidden	N	0	0	3	4	1	0	0	0
	L			190	158	160			
	W			57	43	40			
	K			8.3	11.0	9.8			
Revett	N	0	0	3	14	8	1	1	1
	L			170	170	198	240	230	230
	W			23	25	50	130	80	100
	K			4.7	5.1	6.5	9.4	6.6	8.2
Lower Stevens	N	0	0	6	7	8	2	0	0
	L			183	206	231	225		
	W			40	66	101	85		
	K			6.5	7.5	8.2	7.5		

SEC1A

Table 4.

Lake	Age	1	2	3	4	5	6	7	8
Upper Stevens	N	0	0	0	9	11	2	0	0
	L				181	191	190		
	W				24.4	33	40		
	K				4.1	4.70	5.8		
Roman Nose #1	N	0	0	0	1	7	1	0	0
	L				180	190	200		
	W				52	59	64		
	K				8.9	8.60	8.0		
Roman Nose #2	N	0	0	0	3	5	3	0	0
	L				187	214	210		
	W				62	70	93		
	K				9.50	7.1	10.0		
Revett	N	0	0	3	14	8	1	1	1
	L			170	170	198	240	230	230
	W			23	25	50	130	80	100
	K			4.7	5.1	6.5	9.4	6.6	8.2

Table 5. Physical and chemical characteristics of eight mountain lakes in north Idaho, 1992.

Lake	Surface area (ha)	Maximum depth (ha)	Elevation (m)	Mean Secchi depth (m)	pH	Alkalinity (mg/l)	Conductivity (umhos)
Elsie	8.2	14.0	1,539	6.5		60	
Lower Glidden	4.1	3.0	1,703	3		40	
Upper Glidden	4.5	26.3	1,797	9.5		40	
Revett	4.5	11.0	1,726	10	8.6	60	6.6
Upper Stevens	5.0	16.8	1,750	6.7	8.2	60	4.2
Lower Stevens	12.3	35.7	1,693	12.5	8.3	60	4.2
Roman Nose #1	6.5	15.6	1,805	10.0	7.4	60	7.0
Roman Nose #2	3.2	6.0	1,888	6.0	7.4	40	7.0

SEC1A

Table 6. Dissolved oxygen (mg/l) (DO) and temperature (°C) profiles for eight mountain lakes in north Idaho, 1992.

Depth (m)	Lake Elsie		Lower Glidden		Upper Glidden		Revett		Lower Stevens		Upper Stevens		Roman Nose #1		Roman Nose #2	
	DO	°C	DO	°C	DO	°C	DO	°C	DO	°C	DO	°C	DO	°C	DO	°C
0	10.9	12.7	11.0	9.2	11.2	8.2	8.1	14.6	8.9	12.9	8.8	13.1	9.7	6.8	9.3	7.2
1	10.9	12.7	10.9	9.2	11.2	8.2	8.5	14.2	8.9	12.8	8.7	12.9	9.8	6.7	10.1	6.6
2	10.8	12.0	11.0	9.0	11.2	8.0	8.5	14.1	9.0	12.8	8.7	12.9	9.7	6.7	10.0	6.4
3	11.9	10.5	10.9	8.8	11.2	7.9	7.4	13.9	9.0	12.5	8.5	12.8	9.9	6.7	10.1	6.4
4	12.0	8.0			11.2	7.9	7.4	13.9	8.9	12.5	8.5	12.8	9.4	6.7	9.9	6.4
5	11.6	6.6			11.5	6.8	8.8	13.0	8.7	23.5	8.3	12.8	9.6	6.7		
6	10.4	5.9			11.6	6.1	9.3	12.2	1.1	12.4	8.6	12.8	9.5	6.7		
7	10.2	5.5			11.3	5.5	10.4	11.3	8.4	12.4	8.0	12.8	9.4	6.7		
8	9.5	5.0			11.7	5.0	10.7	10.5	9.4	12.2	7.9	12.8	9.1	6.7		
9	8.0	4.5			11.8	4.7	11.0	9.7	11.7	9.7	7.7	12.7	9.0	6.7		
10	4.9	4.0			11.5	4.4	11.1	9.4	10.8	8.1	2.9	12.2	9.0	6.7		
Bottom			10.9	8.8			10.9	9.4	7.4	4.1	2.9	12.2	9.1	6.7	8.8	6.7

SEC1A

DISCUSSION

Creel Survey

Lake Elsie and Lower Glidden Lake supported 1,212 h/ha and 768 h/ha, respectively. The fishing effort on these lakes was very high. Some examples of fishing effort from other lakes and reservoirs around the state included Lake Pend Oreille 11 h/ha, Lake Lowell 5 h/ha, Cascade Reservoir 30 h/ha, Ashton Reservoir 83 h/ha and Henrys Lake 41 to 142 h/ha.

Anglers kept more rainbow trout than brook trout (Table 1), and most of the released fish were brook trout. Anglers released brook trout because they were too small. No angler interviewed had a limit (10) of brook trout. Controlling the brook trout population by angling would not be successful even if limits were increased.

Population Survey

Coefficients of condition (K_{TL}) for brook trout in all lakes surveyed indicated that the brook trout populations were stunted. Coefficients of condition (K) can provide a good baseline to measure the effect of predators and can be used to compare with other populations of brook trout. The K_{TL} in Upper Stevens and Revett lakes (Table 4) were similar to a stunted population of brook trout in Deep Lake (Janssen in progress). The K_{TL} values for brook trout in the other six lakes were similar to the K values of stunted populations of brook trout reported by Janssen (in progress) for Rapid, Trail and Anderson lakes.

Theoretically, the addition of a predator should improve the condition of a stunted population. Janssen reported a significant increase in K for brook trout in Deep Lake after the stocking of brown trout *Salmo trutta* averaging 290 mm at a density of 70 fish/ha. Janssen reported brown trout ranging from 140 to 160 mm when stocked did not improve condition of brook trout in Deep Lake.

In 1993, Department biologists will stock bull trout into Revett, Upper Glidden, Upper Stevens, and Roman Nose #1 and #2 lakes. The density will range from 40 fish/ha to 80 fish/ha. An evaluation will be conducted in 1995 or 1996.

Mountain Lake Stocking

The mountain lake stocking program for 1992 was completed with minimal changes. The majority of lakes (24 in 1992) were stocked with westslope cutthroat trout. The access road to Callahan Lake was repaired, and 1992 was the first time since 1988 that this lake was stocked.

All lakes scheduled for rainbow trout in 1992 received fish, but the stock of rainbow varied. Domestic Kamloop rainbow trout were stocked in two lakes in the Kootenai River drainage. Mount Lassen rainbow trout were stocked in two lakes in the Little North Fork

Clearwater River Drainage as a substitute for domestic Kamloops. Four drive-to lakes received put-and-take rainbow of the Hayspur strain. Only limited numbers of Arctic grayling Thymallus arcticus were available in 1992, and four lakes were stocked at a reduced rate. Golden trout remain difficult to obtain, so grayling have been utilized as a substitute specialty fish.

Bloom Lake continues to be stocked with fingerling brook trout. It also received it's second stocking of splake in 1992. Cutthroat trout for Dennick Lake were mistakenly stocked in Bloom Lake in 1992.

Brown trout were stocked in the three lakes on the schedule in 1992, and also by mistake in Dennick Lake. Several lakes were stocked with donated helicopter time from the U.S. Forest Service and Bloom and Dennick lakes were misidentified. Stocking histories for the past 11 years for Region 1 lakes are summarized in Appendix A.

Insufficient creel census data was available in 1992 to evaluate program goals.

The stocking schedule for Region 1 mountain lakes attempts to balance the number of each species of fish and the number of lakes to be stocked each year (Appendices B and C). Deviations from the schedule have most often been caused by lack of fish, lack of proper sized fish (too large at stocking time), access problems, and conflicts with other programs. Lakes in the Little North Clearwater River drainage were stocked by plane from the McCall Hatchery in 1992.

Species diversity will be maintained by utilizing westslope cutthroat and domestic Kamloops rainbow trout for most lakes, golden trout and grayling (when available) for specialty lakes, and brown trout for attempted control of stunted brook trout. Bull trout will be used to evaluate control of stunted brook trout in 1993.

The lack of suitable-sized domestic Kamloops rainbow trout has forced us to utilize different stocks of rainbow trout in order to maintain some species diversity in mountain lakes. Rainbow trout will not be stocked in mountain lakes in the Pend Oreille drainage to avoid diluting the wild Gerrard rainbow trout gene pool in Lake Pend Oreille, and we will stock only westslope cutthroat in lakes specified for cutthroat.

RECOMMENDATIONS

1. Develop a mountain lake management plan that addresses management objectives, standardized survey techniques, and evaluation procedures for both short- and long-term goals.
2. Verify lake acreage estimates from aerial photos so that stocking density recommendations are accurate.
3. Evaluate trout growth relative to stocking density and frequency to determine if existing stocking recommendations are resulting in desirable fisheries.
4. Utilize the voluntary angler diary program to evaluate fish population characteristics and angler satisfaction.

4. Utilize the voluntary angler diary program to evaluate fish population characteristics and angler satisfaction.
5. Work with the Forest Service and Boundary County Backpackers to create a trail into Smith Lake to provide improved angling opportunity for grayling.
6. Consider stocking grayling or golden trout into a more accessible lake to provide increased angling opportunity for specialty stocks. Consult Department personnel and interested anglers to determine suitable waters. Survey lakes, and consider a restoration project to eliminate competition from non-specialty stocks.
7. Obtain additional brook trout specimens from Roman Nose #1 and #2 to add to the baseline data of size and condition at age prior to bull trout stocking in 1993.

Bull trout stocking densities:

8.	Upper Glidden Lake	40 fish/ha	-	180 fish
	Upper Steven Lake	80 fish/ha	-	400 fish
	Revett Lake	70 fish/ha	-	315 fish
	Roman Nose #1	60 fish/ha	-	390 fish
	Roman Nose #2	50 fish/ha	-	162 fish

9. Evaluate bull trout stocking in 1995 or 1996.
10. Evaluate return to the creel for put-and-take rainbow trout in Dismal and Antelope lakes.

92-DJRPT

A P P E N D I C E S

Appendix A. Number and species of fish (fry except where noted) stocked into mountain lakes in Region 1 from 1981-1992.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Kootenai	Hidden (1-103)	50	1981	15,922	318	westslope cutthroat	
			1982	15,656	313	Kamloops rainbow	
			1983	12,107	242	Henry's Lake cutthroat	
			1984	12,768	255	Kamloops rainbow	
			1985	12,512	250	westslope cutthroat	
			1986	6,000	120	westslope cutthroat	
			1987	12,500	250	westslope cutthroat	
			1988	12,096	242	Kamloops rainbow	
			1989	3,082	62	Kamloops rainbow	
			1989	12,495	250	westslope cutthroat	
			1990	12,928	258	Kamloops rainbow	
			1991	12,500	250	westslope cutthroat	
			1992	8,440	169	Kamloops rainbow	
	Lake Mountain (Cuttoff) (1-104)	7	1983	1,723	246	Henry's Lake cutthroat	
			1985	1,748	250	westslope cutthroat	
			1987	1,750	250	westslope cutthroat	
			1989	1,750	250	westslope cutthroat	
			1991	1,750	250	westslope cutthroat	
	West Fork (1-109)	12	1981	6,704	559	westslope cutthroat	
			1982	3,648	304	Kamloops rainbow	
			1983	3,016	251	Henry's Lake cutthroat	
			1984	3,010	251	Kamloops rainbow	
			1985	2,990	250	westslope cutthroat	
			1986	4,495	375	westslope cutthroat	
			1987	3,000	250	westslope cutthroat	
			1988	3,007	250	westslope cutthroat	
			1989	3,087	257	Kamloops rainbow	
			1990	3,000	250	westslope cutthroat	
			1991	3,000	250	Kamloops rainbow	
			1992	3,000	250	westslope cutthroat	
	Long Mountain (1-112)	3	1987	1,000	333	Grayling	
			1990	1,500	500	Grayling	
			1991	1,500	500	Grayling	
			1992	664	331	Grayling	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Kootenai	Parker (1-113)	3	1986	1,225	408	Golden trout	
			1988	1,002	334	Grayling	
			1990	1,410	470	Golden trout	
			1991	1,500	500	Grayling	
			1992	265	122	Grayling	
	Smith (Long Canyon) (1-115)	6	1987	2,000	333	Grayling	
			1988	3,000	500	Grayling	
			1990	3,000	500	Grayling	
			1991	1,000	167	Grayling	
	Big Fisher (1-117)	10	1981	3,352	335	westslope cutthroat	
			1983	2,486	248	Henrys Lake cutthroat	
			1985	2,530	253	westslope cutthroat	
			1987	2,500	250	westslope cutthroat	
			1990	2,500	250	westslope cutthroat	
			1992	2,500	250	westslope cutthroat	
	Myrtle (1-122)	20	1983	5,189	259	westslope cutthroat	
			1985	5,100	255	westslope cutthroat	
			1987	5,000	250	westslope cutthroat	
			1989	5,000	250	westslope cutthroat	
			1991	4,953	248	westslope cutthroat	
	Trout (1-124)	7	1981	2,514	359	westslope cutthroat	
			1982	3,296	471	Kamloops rainbow	
			1983	1,720	247	Henrys Lake cutthroat	
			1984	1,733	248	Kamloops rainbow	
			1985	1,748	250	westslope cutthroat	
			1986	1,721	246	westslope cutthroat	
			1987	1,751	250	westslope cutthroat	
			1988	1,743	250	westslope cutthroat	
			1990	1,750	250	westslope cutthroat	
			1992	1,750	250	Kamloops rainbow	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Kootenai	Pyramid (1-125)	11	1981	4,190	381	westslope cutthroat	
			1982	3,296	300	Kamloops rainbow	
			1983	2,702	246	Henrys Lake cutthroat	
			1984	2,736	249	Kamloops rainbow	
			1985	2,760	251	westslope cutthroat	
			1986	2,741	249	westslope cutthroat	
			1987	2,750	250	westslope cutthroat	
			1988	2,752	250	westslope cutthroat	
			1989	2,750	250	Kamloops rainbow	
			1990	2,765	251	westslope cutthroat	
			1991	2,750	250	Kamloops rainbow	
			1992	2,750	250	westslope cutthroat	
	Ball Creek (1-126)	6	1983	1,513	255	Henry Lake cutthroat	
			1984	1,000	167	westslope cutthroat	
			1986	1,498	250	westslope cutthroat	
			1988	1,500	250	westslope cutthroat	
			1990	1,500	250	westslope cutthroat	
			1992	1,500	250	westslope cutthroat	
	Little Ball Creek (1-127)	4	1984	1,500	375	westslope cutthroat	
			1986	956	239	westslope cutthroat	
			1988	1,000	250	westslope cutthroat	
			1990	1,000	250	westslope cutthroat	
			1992	1,000	250	westslope cutthroat	
	Snow (1-134)	10	1982	3,008	301	westslope cutthroat	
			1983	2,872	287	Henrys Lake cutthroat	
			1987	2,500	250	westslope cutthroat	
			1989	2,400	240	westslope cutthroat	
			1991	2,500	250	westslope cutthroat	
	Roman Nose #3 (1-137)	12	1983	2,320	193	Domestic Kamloops (size 2)	
			1985	3,000	250	westslope cutthroat	
			1986	3,000	250	westslope cutthroat	
			1987	3,000	250	westslope cutthroat	
			1988	3,000	250	westslope cutthroat	
			1989	3,000	250	Kamloops rainbow	
			1990	1,000	83	westslope cutthroat (size 2)	
			1991	3,150	262	Kamloops rainbow	
			1992	1,305	109	westslope cutthroat (size 2)	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Kootenai	Solomon (1-146)	9	1982	3,040	338	Kamloops rainbow	
			1983	2,162	240	Henrys Lake cutthroat	
			1984	2,268	252	Kamloops rainbow	
			1985	2,250	250	Westslope cutthroat	
			1986	2,500	278	Westslope cutthroat	
			1987	2,250	250	Westslope cutthroat	
			1988	2,250	250	Westslope cutthroat	
			1989	712	79	Westslope cutthroat (broodstock)	
			1990	2,250	250	Westslope cutthroat	
			1991	1,024	114	Westslope cutthroat (size 2)	
			1991	480	53	Westslope cutthroat (broodstock)	
			1992	1,045	116	Westslope cutthroat (size 2)	
	Spruce (1-147)	5	1982	2,432	486	Kamloops rainbow	
			1983	1,297	259	Henrys Lake cutthroat	
			1984	2,520	504	Kamloops rainbow	
			1985	1,250	250	Westslope cutthroat	
			1986	1,250	250	Westslope cutthroat	
			1987	1,250	250	Westslope cutthroat	
			1988	1,250	250	Westslope cutthroat	
			1989	1,265	253	Westslope cutthroat	
			1990	1,250	250	Westslope cutthroat	
			1991	1,247	250	Kamloops rainbow	
	Queen (1-148)	5	1983	1,296	259	Henrys Lake cutthroat	
			1986	1,250	250	Westslope cutthroat	
			1988	1,250	250	Westslope cutthroat	
			1990	1,250	250	Westslope cutthroat	
			1992	1,250	250	Westslope cutthroat	
	Debt (1-150)	5	1985	1,250	250	Westslope cutthroat	
			1989	1,250	250	Westslope cutthroat	
			1991	1,250	250	Westslope cutthroat	
	Copper (1-154)	5	1983	1,297	259	Henrys Lake cutthroat	
			1984	1,390	278	Westslope cutthroat	
			1986	1,250	250	Westslope cutthroat	
			1988	1,247	250	Westslope cutthroat	
			1990	1,250	250	Westslope cutthroat	
			1992	1,250	250	Westslope cutthroat	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Kootenai	Callahan (Smith) (1-166)	10	1984	2,500	250	westslope cutthroat	
			1987	2,522	252	westslope cutthroat	
			1988	2,500	250	westslope cutthroat	
			1992	2,563	251	westslope cutthroat	
	Estelle (1-167)	5	1988	1,075	215	Brown trout	Test control of stunted brook trout.
			1990	500	100	Brown trout (size 3)	
			1992	150	30	Brown trout (size 2)	
Pend Oreille	Hunt (2-101)	12	1982	3,648	304	Kamloops rainbow	
			1985	3,000	250	westslope cutthroat	
			1986	3,000	250	westslope cutthroat	
			1987	3,033	253	westslope cutthroat	
			1988	3,000	250	westslope cutthroat	
			1989	5,000	417	westslope cutthroat	
			1990	3,000	250	westslope cutthroat	
			1991	3,000	250	westslope cutthroat	
			1992	3,023	250	westslope cutthroat	
	Standard (2-103)	16	1983	4,021	251	Henrys Lake cutthroat	
			1985	4,000	250	westslope cutthroat	
			1987	3,962	248	westslope cutthroat	
			1989	4,000	250	westslope cutthroat	
			1991	4,000	250	westslope cutthroat	
	Two Mouth #1 (2-106)	?	1981	2,258		westslope cutthroat	Discontinue stocking due to winter kill.
	Two Mouth #2 (2-107)	5	1981	2,258	452	westslope cutthroat	
			1983	2,054	411	Henrys Lake cutthroat	
			1985	1,265	253	westslope cutthroat	
			1987	1,269	254	westslope cutthroat	
			1989	1,265	253	westslope cutthroat	
			1991	1,250	250	westslope cutthroat	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Pend Oreille	Two Mouth #3 (2-108)	20	1981	6,774	339	westslope cutthroat	
			1983	4,973	249	Henrys Lake cutthroat	
			1984	5,280	264	westslope cutthroat	
			1986	5,000	250	westslope cutthroat	
			1988	5,000	250	westslope cutthroat	
			1990	5,000	250	westslope cutthroat	
			1992	,000	250	westslope cutthroat	
	Mollies (2-114)	2	1981	3,352	1,672	westslope cutthroat	
			1983	648	324	Henrys Lake cutthroat	
			1985	506	253	westslope cutthroat	
			1987	508	254	westslope cutthroat	
			1989	500	250	westslope cutthroat	
			1991	500	250	westslope cutthroat	
	Caribou (near West Fk Mtn) (2-116)	6.8	1984	1,752	258	Henrys Lake cutthroat	
			1986	1,750	257	westslope cutthroat	
			1987	1,750	257	westslope cutthroat	
			1988	1,750	257	westslope cutthroat	
			1990	1,750	257	westslope cutthroat	
			1992	1,750	257	westslope cutthroat	
	Fault (Hunt Peak #1) (2-121)	6	1981	2,258	376	westslope cutthroat	
			1983	2,872	478	Henrys Lake cutthroat	
			1985	1,500	250	westslope cutthroat	
			1987	1,500	250	westslope cutthroat	
			1989	1,553	259	westslope cutthroat	
			1991	2,275	379	westslope cutthroat	Received McCormick Lake fish as well.
	McCormick (Hunt Peak #2) (2-122)	3.1	1981	2,258	728	westslope cutthroat	
			1985	780	252	westslope cutthroat	
			1987	775	250	westslope cutthroat	
			1989	805	260	westslope cutthroat	
			1991	816	263	westslope cutthroat	
	Little Harrison (2-126)	6.5	1981	2,258	347	westslope cutthroat	
			1983	1,651	254	Henrys Lake cutthroat	
			1987	1,625	250	westslope cutthroat	
			1988	1,625	250	westslope cutthroat	
			1990	1,625	250	westslope cutthroat	
			1992	1,625	250	westslope cutthroat	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Pend Oreille	Beehive (2-128)	7	1981	2,258	323	westslope cutthroat	
			1983	1,723	246	Henry's Lake cutthroat	
			1985	1,740	248	westslope cutthroat	
			1986	1,803	258	westslope cutthroat	
			1987	1,750	250	westslope cutthroat	
			1989	2,164	309	westslope cutthroat	
			1991	1,750	250	westslope cutthroat	
	Harrison (2-129)	29	1981	9,218	318	westslope cutthroat	
			1982	6,972	240	Kamloops rainbow	
			1983	7,243	250	Henry's Lake cutthroat	
			1984	7,296	250	Kamloops rainbow	
			1985	7,200	248	westslope cutthroat	
			1986	6,870	237	westslope cutthroat	
			1987	7,264	250	westslope cutthroat	
			1988	7,250	250	westslope cutthroat	
			1989	7,479	258	westslope cutthroat	
			1990	7,250	250	westslope cutthroat	
			1991	7,246	250	westslope cutthroat	
			1992	7,250	250	westslope cutthroat	
	Beaver (2-130)	5	1990	500	100	Brown trout (size 3)	Test control of stunted brook trout.
			1992	150	30	Brown trout (size 2)	
	Dennick (2-171)	8	1981	5,800	725	westslope cutthroat	
			1983	1,939	242	Henry's Lake cutthroat	
			1984	2,060	258	westslope cutthroat	
			1985	2,010	251	westslope cutthroat	
			1986	2,500	312	westslope cutthroat	
			1987	2,000	250	westslope cutthroat	
			1988	2,000	250	westslope cutthroat	
			1989	2,064	258	westslope cutthroat	
			1990	2,000	250	westslope cutthroat	
			1991	2,000	250	westslope cutthroat	
			1992	2,000	250	westslope cutthroat	
			1992	150	19	Brown trout	Stocked by mistake (helicopter plant).

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Pend Oreille	Sand (2-172)	5	1981	3,480	696	westslope cutthroat	
			1982	8,360	1,672	Kokanee	
			1983	1,221	244	Henrys Lake cutthroat	
			1984	1,254	251	westslope cutthroat	
			1985	1,260	252	westslope cutthroat	
			1986	1,250	250	westslope cutthroat	
			1987	1,250	250	westslope cutthroat	
			1988	1,247	250	westslope cutthroat	
			1989	1,250	250	westslope cutthroat	
			1990	1,250	250	westslope cutthroat	
			1991	1,250	250	westslope cutthroat	
			1992	1,250	250	westslope cutthroat	
	Bloom (2-173)	20	1981	24,402	1,220	Brook trout	
			1982	10,620	531	Brook trout	
			1984	5,041	252	Brook trout	
			1985	4,599	230	Brook trout	
			1986	5,360	268	Brook trout	
			1987	5,000	250	Brook trout	
			1988	5,000	250	Brook trout	
			1989	5,000	250	Brook trout	
			1990	10,013	500	Brook trout	
			1990	500	25	Splake (size 2)	
			1991	4,000	200	Brook trout	
			1992	5,000	250	Brook trout	
			1992	2,000	100	westslope cutthroat	Stocked by mistake (helicopter plant).
			1992	500	25	Splake (size 3)	
	Porcupine (2-182)	13	1982	1,296	100	Kamloops rainbow	
			1983	2,872	220	Domestic Kamloops (size 2)	
			1984	1,016	78	Catchable rainbow	
			1985	1,000	77	Catchable rainbow	
			1986	1,075	83	Mt. Lassen rainbow (size 3)	
			1987	--	--		Road washed out.
			1988	600	46	Mt. Lassen rainbow (size 3)	
			1989	690	53	Mt. Lassen rianbow (size 3)	
			1990	750	58	Catchable rainbow	
			1991			--	Road washed out.

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/a.	Stock of fish	Comments
<u>Pend Oreille</u>	Moose (2-185)	16.5	1987	1,00	61	Brown trout	Test control on stunted brook trout.
			1988	4,515	274	Brown trout	
			1990	500	30	Brown trout (size 3)	
			1992	500	30	Brown trout (size 2)	
	Antelope (2-190)	16	1981	5,000	312	Westslope cutthroat	
			1982	5,032	314	Westslope cutthroat	
			1989	200	12	Shepard of the Hills rainbow (size 3)	
			1989	1,155	72	Mt. Lassen rainbow (size 3)	
			1990	1,000	63	Catchable rainbow	
			1990	200	12	Westslope cutthroat broodstock	
			1991	2,000	125	Westslope cutthroat (size 2)	
			1991	1,100	69	Eagle Lake rainbow (size 3)	
			1991	50	3	Creston broodstock rainbow (Eagle Lake stock)	
			1992	863	54	Hayspur rainbow (size 3)	
	Caribou (near Keokee Mtn) (2-196)	6.8	1983	2,872	422	Henrys Lake cutthroat	
			1984	1,750	257	Westslope cutthroat	
			1985	1,700	250	Westslope cutthroat	
			1986	1,500	220	Westslope cutthroat	
			1987	1,704	250	Westslope cutthroat	
			1988	1,722	253	Westslope cutthroat	
			1989	1,700	250	Westslope cutthroat	
			1990	1,700	250	Westslope cutthroat	
			1991	1,700	250	Westslope cutthroat	
			1992	1,750	257	Westslope cutthroat	
<u>Spokane</u>	Mirror (3-117)	5	1981	5,000	1,000	Westslope cutthroat	Winter kill lake, before further stocking.
	Elsie (3-119)	10	1982	1,440	144	Catchable rainbow	Stock put-and-take (catchable) rainbow
			1983	1,500	150	Catchable rainbow	
			1984	2,865	286	Catchable rainbow	
			1985	3,005	300	Catchable rainbow	
			1986	3,024	302	Catchable rainbow	
			1987	2,000	200	Hayspur rainbow (size 3)	
			1988	4,050	405	Hayspur rainbow (size 3)	
			1989	2,856	284	Mt. Lassen rainbow (size 3)	
			1990	3,000	300	Catchable rainbow	
			1991	3,516	350	Eagle Lake and Hayspur rainbow (size 3)	
			1992	4,020	402	Hayspur rainbow (size 3)	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Spokane	Lower Glidden (3-123)	12	1981	1,950	162	Catchable rainbow	
			1982	1,880	157	Catchable rainbow	
			1983	1,000	83	Catchable rainbow	
			1984	4,945	412	Catchable rainbow	
			1985	3,018	251	Catchable rainbow	
			1986	3,011	251	Catchable rainbow	
			1987	3,277	273	Hayspur rainbow (size 3)	
			1988	3,001	250	Hayspur rainbow (size 3)	
			1989	2,836	236	Mt. Lassen rainbow (size 3)	
			1990	1,775	148	Catchable rainbow	
			1991	1,986	165	Hayspur rainbow (size 3)	
			1992	3,534	295	Hayspur rianbow (size 3)	
	Upper Glidden (3-124)	10	1980	992	99	Kamloops rainbow	Evaluate Kamloops control of stunted brook trout.
	Gold (3-125)	3	1981	1,000	333	westslope cutthroat	Shallow, need to evaluate for survival.
			1983	1,005	335	Henrys Lake cutthroat	
			1987	750	250	westslope cutthroat	
			1989	750	250	westslope cutthroat	
			1991	750	250	Mt. Lassen rainbow	
	Revett	12	1980	992	83	Kamloops rainbow	Evaluate Kamloops control of stunted brook trout.
	Crater (3-133)	5	1983	5,000	1,000	Grayling	Reserve for grayling.
			1987	2,100	420	Grayling	
			1988	2,500	500	Grayling	
			1990	2,500	500	Grayling	
			1991	2,500	500	Grayling	
	Dismal (3-138)		1983	1,500		Catchable rainbow	Reduce stocking to 250 fish and evaluate.
			1984	537		Catchable rainbow	
			1985	490		Catchable rainbow	
			1986	253		Catchable rainbow	
			1987	249		Hayspur rainbow (size 3)	
			1988	260		Mt. Lassen rainbow (size 3)	
			1988	260		Hayspur rainbow (size 3)	
			1989	225		Mt. Lassen rainbow (size 3)	
			1990	250		Catchable rainbow	
			1991	243		Hayspur rainbow (size 3)	
			1992	250		Hayspur rainbow (size 3)	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Spokane	Bacon (3-144)	9	1981	4,000	444	westslope cutthroat	
			1985	2,255	250	westslope cutthroat	
			1987	2,250	250	westslope cutthroat	
			1989	2,250	250	westslope cutthroat	
			1991	2,250	250	westslope cutthroat	
	Forage (3-146)	13	1987	3,150	242	Golden trout	Reserve for goldens or grayling.
			1988	3,250	250	Grayling	
			1989	2,000	154	Grayling	
			1990	3,250	250	Goldent trout	
			1992	600	46	Grayling	
	Halo (3-147)	12	1981	5,000	417	westslope cutthroat	
			1985	3,010	251	westslope cutthroat	
			1987	3,000	250	westslope cutthroat	
			1989	3,000	250	westslope cutthroat	
			1991	3,000	250	westslope cutthroat	
	Crystal (3-160)	10	1981	9,988	999	westslope cutthroat	
			1983	4,380	438	Henrys Lake cutthroat	
			1985	2,510	251	westslope cutthroat	
			1987	2,510	251	westslope cutthroat	
			1988	2,500	250	westslope cutthroat	
			1989	2,500	250	westslope cutthroat	
			1991	2,500	250	westslope cutthroat	
Little Nork Fork Clearwater	Devils Club (6-113)	4	1981	3,014	753	westslope cutthroat	
			1986	1,000	250	westslope cutthroat	
			1988	1,000	250	westslope cutthroat	
			1990	1,093	273	westslope cutthroat	
			1991	1,093	273	westslope cutthroat	
			1992	1,000	250	westslope cutthroat	
	Big Talk (6-114)		1986	1,500		westslope cutthroat	
			1988	2,500		westslope cutthroat	
			1990	2,737		westslope cutthroat	
			1992	2,500		westslope cutthroat	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Little Mork							
Fork Clearwater	Larkins (6-117)	12	1981	3,014	251	westslope cutthroat	
			1986	3,000	250	westslope cutthroat	
			1988	3,000	250	westslope cutthroat	
			1990	3,278	273	westslope cutthroat	
	Mud (6-118)	6	1981	3,014	502	westslope cutthroat	
			1987	1,500	250	westslope cutthroat	
			1989	1,500	250	westslope cutthroat	
			1991	1,500	250	Mt. Lassen rainbow	
	Hero (6-119)	4	1981	3,014	753	westslope cutthroat	
			1986	1,000	250	westslope cutthroat	
			1988	1,000	250	westslope cutthroat	
			1990	1,000	273	westslope cutthroat	
			1992	1,000	250	westslope cutthroat	
	Heart (6-122)	40	1981	3,014	75	westslope cutthroat	
			1986	10,000	250	westslope cutthroat	
			1990	10,000	250	Mt. Lassen rainbow	
			1992	10,000	250	Mt. Lassen rainbow	
	Northbound (6-123)	12	1981	3,014	251	westslope cutthroat	
			1986	3,000	250	westslope cutthroat	
			1988	3,000	250	westslope cutthroat	
			1990	3,278	273	westslope cutthroat	
			1992	3,000	250	westslope cutthroat	
	Skyland (6-125)	13	1981	3,014	232	westslope cutthroat	
			1987	3,250	250	westslope cutthroat	
			1989	3,250	250	westslope cutthroat	
			1991	3,250	250	Mt. Lassen rainbow	
	Fawn (6-126)	13	1981	3,014	232	westslope cutthroat	
			1986	3,250	250	westslope cutthroat	
			1988	3,250	250	westslope cutthroat	
			1990	3,565	274	westslope cutthroat	
			1992	3,250	250	westslope cutthroat	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Little Nork							
Fork Clearwater	Noseeum (6-130)	4	1981	1,174	294	Rainbow/cutthroat hybrid	
			1985	1,008	251	Weststope cutthroat	
			1987	1,000	250	Weststope cutthroat	
			1989	1,000	250	Weststope cutthroat	
			1991	1,000	250	Westslope cutthroat	
	Steamboat (6-131)	9	1981	1,174	130	Rainbow/cutthroat hybrid	Reserve for grayling.
			1986	2,000	222	Grayling	
			1988	4,500	500	Grayling	
			1989	2,000	222	Grayling	
			1990	4,500	500	Grayling	
			1991	3,500	389	Grayling	
			1992	650	72	Grayling	
	Copper (6-201)	3	1981	1,000	333	Weststope cutthroat	
			1981	1,000	333	Rainbow/cutthroat hybrid	
			1985	765	255	Weststope cutthroat	
			1989	750	250	Weststope cutthroat	
			1991	750	250	Westslope cutthroat	
			1992	1,250	417	Westslope cutthroat	
	Gold (6-202)	8	1986	2,000	250	Westslope cutthroat	
			1988	2,000	250	Weststope cutthroat	
			1990	2,185	273	Weststope cutthroat	
	Tin (6-204)	3	1987	750	250	Weststope cutthroat	
			1988	750	250	Weststope cutthroat	
			1990	750	250	Blackfoot rainbow	
			1992	750	250	Mt. Lassen rainbow	
	Silver (6-205)	10	1981	200	200	Westslope cutthroat	
			1981	888	89	Rainbow	
			1985	999	100	Mt. Lassen rainbow	
			1989	2,500	250	Westslope cutthroat	
			1991	2,500	250	Westslope cutthroat	

Appendix B. Odd year stocking schedule for Region 1 mountain lakes.

Lake	Code number	Surface acres	Number stocked	Species	Substitute species
Kootenai					
Hidden	01-103	50	12,500	C2	K1
Lake Mountain	01-104	7	1,750	C2	None
West Fork	01-109	12	3,000	K1	C2
Long Mountain	01-112	3	1,500	GR	None
Parker	01-113	3	1,000	GN	GR
Smith	01-115	6	3,000	GR	None
Myrtle	01-122	20	5,000	C2	None
Pyramid	01-125	11	2,750	K1	C2
Snow	01-134	10	2,500	C2	None
Roman Nose #3	01-137	12	3,000	K1	C2
Solomon	01-146	9	2,250	C2	K1
Spruce	01-147	5	1,250	K1	C2
Debt	01-150	5	1,250	C2	None
Callahan	01-166	10	2,500	C2	None
Pend Oreille					
Hunt	01-101	12	3,000	C2	None
Standard	02-103	16	4,000	C2	None
Two Mouth #2	02-107	5	1,250	C2	None
Mollies	02-114	2	500	C2	None
Fault	02-121	6	1,500	C2	None
McCormick	02-122	3.1	775	C2	None
Beehive	02-128	7	1,750	C2	None
Harrison	02-129	29	7,250	C2	None
Dennick	02-171	8	2,000	C2	None
Sand	02-172	5	1,250	C2	None
Bloom	02-173	20	5,000	BK (size 2)	None
Caribou (near Keokee Mtn.)	02-196	6.8	1,700	C2	None

Appendix B. Continued.

Lake	Code number	Surface acres	Number stocked	Species	Substitute species
Spokane					
Gold	03-125	3	750	K1	None
Crater	03-133	5	2,500	GR	None
Bacon	03-144	9	2,250	C2	None
Forage	03-146	13	3,250	GN	GR
Halo	03-147	12	3,000	C2	None
Crystal	03-160	10	2,500	C2	None
Little North Fork Clearwater					
Mud	06-118	6	1,500	K1	None
Skyland	06-125	13	3,250	K1	None
Noseeum	06-130	4	1,000	C2	None
Steamboat	06-131	9	4,500	GR	None
Copper	06-201	3	750	C2	None
Silver	06-205	10	2,500	K1	None

Total number of fish to be stocked: C2 - 62,225; K1 - 18,000; GR - 11,500; GN - 4,250 (grayling can be substituted for goldens); BK - 5,000 size 2.

Appendix C. Even year stocking schedule for Region 1 mountain lakes.

Lake	Code number	Surface acres	Number stocked	Species	Substitute species
Kootenai					
Hidden	01-103	50	12,500	K1	C2
West Fork	01-109	12	3,000	C2	K1
Long Mountain	01-112	3	1,500	GR	None
Parker	01-113	3	1,000	GN	GR
Smith	01-115	6	3,000	GR	None
Big Fisher	01-117	10	1,500	C2	None
Trout	01-124	7	1,750	K1	C2
Pyramid	01-125	11	2,750	C2	K1
Ball Creek	01-126	6	1,500	C2	None
Little Ball Creek	01-127	4	1,000	C2	None
Roman Nose #3	01-137	12	3,000	C2	K1
Solomon	01-146	9	2,250	C2	K1
Spruce	01-147	5	1,250	C2	K1
Queen	01-148	5	1,250	C1	None
Copper	01-154	5	1,250	C2	None
Estelle	01-167	5	1,250	BN	None
Pend Oreille					
Hunt	02-101	12	3,000	C2	None
Two Mouth #3	02-108	20	5,000	C2	None
Caribou (near West Fork Mountain)	02-116	6.8	1,750	C2	None
Little Harrison	02-126	6.5	1,625	C2	None
Harrison	02-129	29	7,250	C2	None
Beaver	02-130	5	1,250	BN	None
Dennick	02-171	8	2,000	C2	None
Sand	02-172	5	1,250	C2	None
Bloom	02-173	20	5,000	BK (size 2)	None
Moose	02-185	16.5	4,200	BN	None
Caribou (near Keokee Mountain)	02-196	6.8	1,700	C2	None

APP1-A

Appendix C. Continued.

Lake	Code number	Surface acres	Number stocked	Species	Substitute species
Spokane					
Crater	03-133	5	2,500	GR	None
Forage	03-146	13	3,250	GN	GR
Little North Fork Clearwater					
Devils Club	06-1 13	4	1,000	C2	None
Big Talk	06-1 14		2,500	C2	None
Larkins	06-117	12	3,000	C2	None
Hero	06-1 19	4	1,00	C2	None
Heart	06-122	40	10,000	K1	None
Northbound	06-123	12	3,000	C2	None
Fawn	06-126	13	32500	C2	None
Steamboat	06-131	9	4,500	GR	None
Gold	06-202	8	2,000	C2	None
Tin	06-204	3	750	K1	None

Total number of fish to be stocked: C2 - 59,075; K1 - 25,000; GR - 11,500; GN - 4,250 (grayling can be substituted for goldens); BK - 5,000 size 2; BN - 6,700.

JOB PERFORMANCE REPORT

State of: Idaho

Name: Regional Fishery Management
Investigations

Project No.: F-71-R-17

Title: Region 1 Lowland Lakes
Investigations

Job No.: 1-b'

Period Covered: July 1, 1992 to June 30, 1993

ABSTRACT

A total of 50,130 westslope cutthroat trout Oncorhynchus clarki lewisi were reared in five net pens on Lake Pend Oreille and released in 1992. An additional 22,725 westslope cutthroat trout, raised at Clark Fork Hatchery, were released into the lake during 1992. All net pen fish received an adipose fin clip, and 287 of these received a \$5.00 reward Floy tag as well. Exploitation of the net pen cutthroat trout was estimated at 1.38%.

The trophy kokanee salmon O. nerka kennerlyi management program in Lower Twin Lake was evaluated in 1992. The largest kokanee salmon sampled in 1992 measured 560 mm in length and weighed 1,050 g. Physical habitat in Lower Twin Lake was also evaluated for potential smallmouth bass Micropterus dolomieu introductions. While the habitat is sufficient to support smallmouth bass, the presence of two illegally-introduced species, northern pike Esox lucius and green sunfish Lepomis cyanellus, negate the introduction of smallmouth bass.

Four north Idaho lowland lakes (Hauser, Cocolalla, Shepherd, and Dawson) were surveyed in 1992 to assess the success of new species introductions.

In 1992, we initiated a two-year study on Hauser and Spirit lakes to assess the hatchery put-and-take versus put-grow-and-take rainbow trout O. mykiss program and the rainbow trout put-and-take program for Cocolalla Lake. Creel census results show that during a six-month period, April through September 1992, Hauser Lake sustained 140 h/ha of fishing effort to harvest an estimated 3,122 rainbow trout. Spirit Lake received 54 h/ha of effort to harvest an estimated 1,435 rainbow trout, and Cocolalla Lake received 27 h/ha of effort to harvest an estimated 1,211 rainbow trout.

In 1989, Jewel Lake was rotenoned to remove yellow perch Perca flavescens from the system. In 1990, the lake was restocked with westslope cutthroat, Henrys Lake rainbow x cutthroat hybrids, and kokanee salmon. Jewel Lake is currently managed as a quality trout fishery with a regulation of two fish, 14 inches (356 mm) or greater, and barbless artificial flies and lures only with no bait. In 1992, we surveyed Jewel Lake to assess the condition of the fishery. Very few trout of harvestable size were found during the survey, and no kokanee salmon were sampled. Yellow perch were also present in the sample.

The feasibility of aquatic vegetation control in McArthur Reservoir was investigated. With waterfowl production as the prime management directive for McArthur Reservoir, chemical control of the aquatic vegetation was disregarded and mechanical removal would offer only short-term benefits at best.

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OBJECTIVES

1. To assess the contribution of net pen raised westslope cutthroat trout Oncorhynchus clarki lewisi to the Lake Pend Oreille fishery.
2. To evaluate Lower Twin Lake for potential smallmouth bass Micropterus dolomieu introduction.
4. To assess the trophy kokanee salmon O. nerka kennerlyi program on Lower Twin Lake.
5. To assess the success of new species introductions in Hauser, Cocolalla, Shepherd, and Dawson lakes.
6. To assess the hatchery put-and-take rainbow trout O. mykiss program in Cocolalla Lake.
7. To assess the hatchery put-and-take versus put-grow-take rainbow trout programs in Spirit and Hauser lakes.
8. To assess the hatchery put-grow-take program in Jewel Lake.
9. To assess the feasibility of vegetation control and reduction in yellow perch Perca flavescens numbers in McArthur Reservoir.

NET PEN CUTTHROAT CULTURE

Introduction

The cutthroat trout net pen culture program on Lake Pend Oreille began in the fall of 1989 when two pens were placed in Garfield Bay. Six net pens were rearing fish in 1992. This program was initiated as an experiment to determine if better returns to fishermen could be achieved by rearing cutthroat trout in net pens in the lake rather than in raceways at the Clark Fork Hatchery. Net pen rearing also significantly reduced hatchery costs because of the funding contributed by cooperators. The program was the product of a cooperative effort supported by the Idaho Department of Fish and Game, Bonner County Fisheries Improvement Association, Washington Water Power, Lake Pend Oreille Idaho Club, Trout Unlimited, and marina operators. Approximately 10,000 westslope cutthroat trout were placed in each net pen in the fall of the year and released the following spring. Survival, growth, and overall health of these fish has been shown to be better than can be achieved in a typical hatchery situation.

Methods

During the fall of 1991 and spring of 1992, six net pens were used to raise 50,130 westslope cutthroat trout. These fish were released May 15, 1992. The net pens were

located at four sites on Lake Pend Oreille; Hudson Bay, Bitter End, Scenic Bay, and Garfield Bay, which had three net pens (Figure 1). The entire release of 50,130 cutthroat trout received an adipose fin clip to identify them in the fishery. In addition to the fin clip, 289 fish received \$5 reward Floy tags (yellow - series 16203 to 16217 and 16226 to 16500) which were inserted into the dorsal musculature of the fish (approximately 50 fish from each of the net pens).

The net pen floating frames were constructed of 6-inch diameter plastic pipe, 20 feet by 20 feet square. The nets (3/8-inch diameter) were suspended from the frame and were 20 feet deep. The four corners of each net were anchored by a 1-gallon container filled with concrete to keep the net from collapsing on itself. The net and frame were secured to boat docks to prevent them from drifting away. One automatic feeder is stationed at each net pen, with the exception of the Scenic Bay pen which is hand fed. Volunteers were responsible for the maintenance of the pens and the feeding of the fish.

Results and Discussion

The net pen cutthroat trout were placed in the net pens in October 1991 and released in May 1992. Mean length of the cutthroat trout in October, when placed in the net pens, was 114 mm. At the time of release, May 1991, the mean length was 173 mm. The growth rate and survival of these fish exceeds that of fish reared in hatchery raceways. In 1989, a comparison of the growth of net pen cutthroat trout versus hatchery-reared fish showed that the net pen fish grew an average of 58 mm during their stay in the net pens, while the hatchery fish grew only 29 mm. Mortality of the hatchery fish was approximately 12 times greater than that of the net pen fish for the same time period as well. Survival of the net pen fish, excluding the Bitter End net pen, in 1992 was estimated at 91.7%. A survival estimate of the fish in the Bitter End net pen was not possible due to a tear in the net that allowed fish to escape prior to inventory in May 1992.

Six reward tags were returned by anglers in 1992. Four of these were from the 1992 release and two were from the 1991 release. In 1991, three tags were returned, all from the 1991 Hudson Bay release. Exploitation in 1990 was estimated at 0.84%, based on a return of two tags, 1991 exploitation was slightly greater at 1.21%. The exploitation rate in 1992 was estimated at 1.38% for the 1992 release and 1.11 % for the 1991 and 1992 combined releases. No tags were returned from the 1990 release in either 1991 or 1992. No estimates on the growth of tagged fish caught by anglers were made because of the estimated lengths reported by the anglers.

Return-to-the-creel estimates for the net pen fish so far are discouraging. Because of the lag time involved in the recruitment of these fish to the fishery, it may be several more years before the net pen project can be fully evaluated. In addition, non-reporting of tagged fish or adipose-clipped fish may be underestimating returns.

An additional 22,725 westslope cutthroat trout were stocked in Lake Pend Oreille in June 1992 from the Clark Fork Hatchery. Ellisport Bay received 3,165 fish, Hope Boat Basin received 9,960 fish, and 9,600 fish were released at Samowen Campground. The average length of these fish was 152 mm at release.

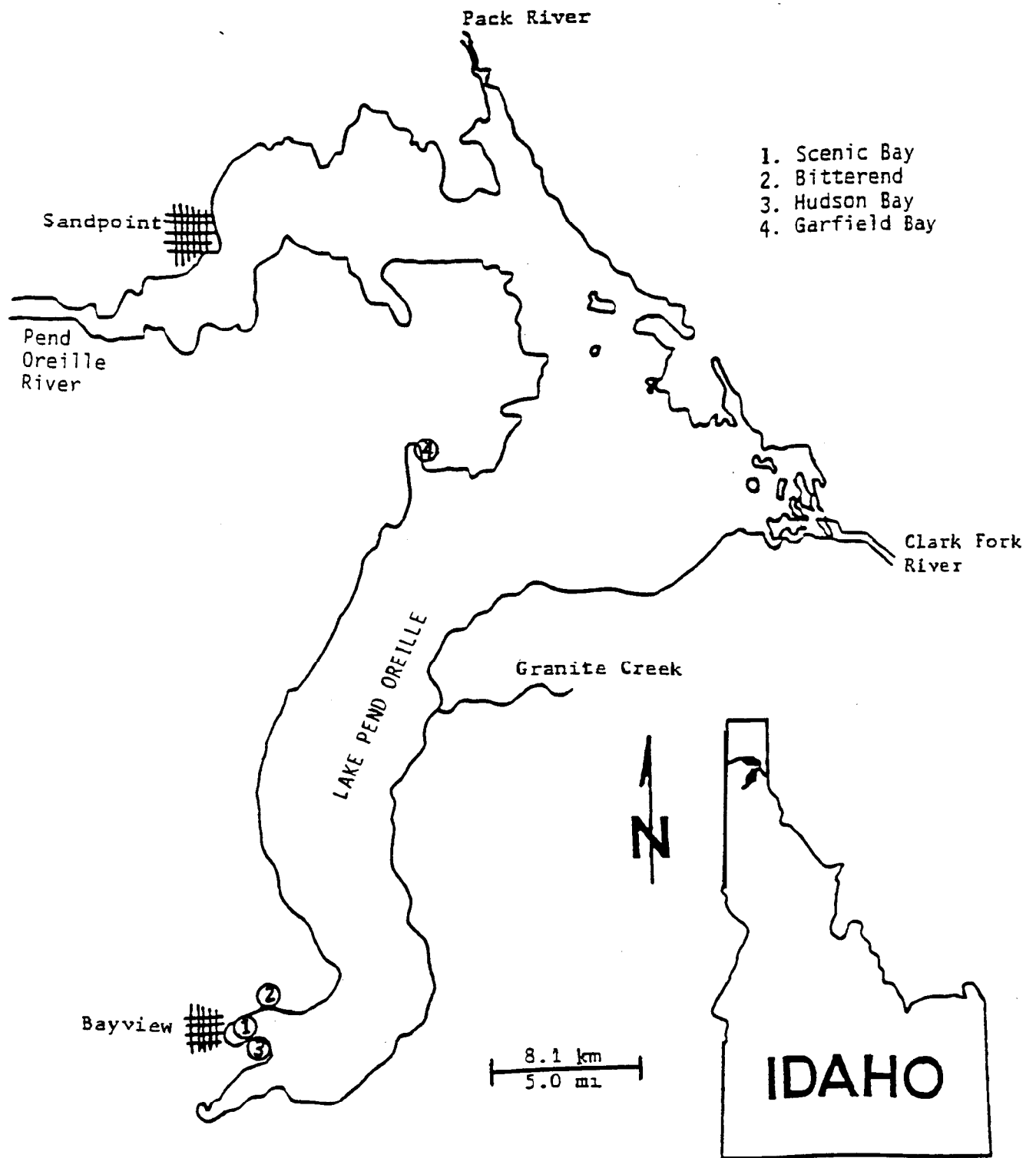


Figure 1. Locations of cutthroat trout net pens in Lake Pend Oreille, 1992.

Recommendations

1. Continue to estimate the exploitation of net pen reared cutthroat trout with the use of Floy reward tags and adipose fin clips.

LOWER TWIN LAKE

Description of Study Area

Lower Twin Lake (158 ha) supported a diverse warm and coldwater fishery. Warmwater fish species present in the lake included largemouth bass Micropterus salmoides, black crappie Pomoxis nigromaculatus, yellow perch, pumpkinseed sunfish Lepomis gibbosus, green sunfish, northern pike, and brown bullhead Ameiurus nebulosus. Green sunfish and northern pike are recent illegal introductions. The primary coldwater fishery consisted of put-and-take rainbow trout. Cutthroat trout, rainbow/cutthroat trout hybrids, brook trout, brown trout, and kokanee salmon were also present. The trout fishery was supplemented annually with stockings of approximately 9,000 put-and-take rainbow trout and varying numbers of cutthroat trout, and brown trout as they were available. The kokanee salmon management program for Lower Twin Lake, since 1990 had consisted of stocking approximately 105,000 fry annually (Table 1). Stocking rates varied considerably prior to 1990 due to the availability of kokanee fry for stocking. This fishery was managed as a quality kokanee salmon fishery, with the kokanee salmon counted in the six fish trout limit.

Methods

We surveyed Lower Twin Lake between April 9 and April 23, 1992 to assess the status of the kokanee population. We also evaluated Lower Twin Lake for a potential introduction of smallmouth bass. Utilizing the Idaho Department of Fish and Game's Lowland Lakes Standard Survey (Appendix A), a total of 14.43 combined sampling units of effort were employed on Lower Twin Lake. The combined sampling units of effort included eight units of gill net effort (four units of floating and sinking gill nets and four units of vertical gill nets), four trap net units, and 2.43 electrofishing units. Two units of minnow trap effort (one unit equaled on minnow trap set overnight) were also employed in an attempt to capture crayfish. The minnow trap units are not included in the 14.43 combined sampling units. Physical attributes of Lower Twin Lake were assessed to determine the amount of suitable habitat available for smallmouth bass.

Results

Only three kokanee salmon, the target species, were captured during our sampling efforts. Non-target fish species sampled included rainbow trout, cutthroat trout, brook trout, largemouth bass, black crappie, yellow perch, pumpkinseed sunfish, green sunfish, and

Table 1. Number of kokanee salmon fry stocked in Lower Twin Lake, Idaho, from 1982 to 1992.

Year	Number stocked
1982	42,824
1983	2,830
1984	2,125
1985	2,007
1986	2,132
1987	9,990
1988	-0-
1989	10,000
1990	106,212
1991	110,760
1992	105,412

northern pike (Appendix B). No crayfish were sampled from Lower Twin Lake. The three kokanee salmon captured measured 160 mm, 530 mm, and 560 mm in length and weighed 41 g, 1,400 g, and 1,050 g, respectively. Age analysis of otoliths showed the 160 mm kokanee salmon to be 2 + years old. The 530 mm kokanee salmon was an age 5 + immature female. The 560 mm kokanee salmon was a 6+ mature spent male that had spawned the fall of 1991. While still alive, this fish was in very poor condition.

Assessment of available habitat suitable for smallmouth bass showed that there were sufficient areas available to provide spawning and rearing of smallmouth bass in Lower Twin Lake. Available prey items would not be a limiting factor either.

Additional information on Lower Twin Lake fish populations, such as back calculation of length at age from scale samples had not yet been summarized and will be presented in 1993.

Discussion

The goal of the lowland lake management program for kokanee was to evaluate the relationship between stocking density and the growth of kokanee and return-to-the-creel. Ideally we could then "create" a fishery that met either a fish size or catch rate goal by varying the stocking rate.

Lower Twin Lake had been stocked with low numbers of kokanee for several years. If our aging is accurate, the age 6 + 560 mm male resulted from a stocking of 2,132 fry. The age 5 + 530 mm female resulted from a stocking of 9,990 fry, and the age 2 + fish resulted from a stocking of 106,212 fry (Table 1). This represented stocking densities of 13, 63, and 671 fry/ha, respectively.

A meaningful evaluation of stocking density of kokanee was not possible with the few fish that were sampled. Five other lakes (Brush, Smith, Hauser, Mirror, and Jewel) were also being stocked with various densities of fry. We were producing limited numbers of large kokanee, but a consistent program had not yet developed.

Sufficient habitat existed in Lower Twin Lake to support smallmouth bass. However, the presence of green sunfish complicated the potential benefits of attempting to establish smallmouth bass. Green sunfish are direct competitors with smallmouth bass, and the possibility of creating a slow-growing smallmouth population exists. Without a significant potential for benefit, our recommendation would be to not introduce another exotic species.

Recommendations

1. Continue stocking kokanee salmon at 105,000 annually (950/ha).
2. Monitor the catch of kokanee on Lower Twin Lake, and if size declines to the 250 mm to 300 mm range, reduce the stocking density.

3. No introduction of smallmouth bass should be made in Lower Twin Lake.

NEW SPECIES INTRODUCTIONS AND HATCHERY

EVALUATIONS Introduction

Hauser, Cocolalla, Shepherd, and Dawson lakes have been the recipients of new species introductions that began in 1985. The Idaho Department of Fish and Game Lowland Lakes Standard Survey (Appendix A) was conducted on these four north Idaho lakes in 1992 to evaluate the success of these introductions. Two of these lakes, Hauser and Cocolalla, along with Spirit Lake were also the focus of a creel census in 1992.

HAUSER LAKE

Description of Study Area

Hauser Lake is located 24 km northwest of Coeur d'Alene (Figure 2). The lake is bathtub shaped and has a surface area of 253 ha. The mean depth is 6.4 m and the maximum depth is 12.2 m. Hauser Lake watershed is 5,864 ha. The watershed is divided up into forest (85%), agriculture (6%), suburban (8%), and wetlands (1 %). The water inflow is supplied by several small tributaries and ground water recharge. The outflow is minimal and eventually disappears as it "sinks" into the Rathdrum Aquifer.

Hauser Lake is used for recreation and potable water. There are several residences scattered around the lake. Recreational activities include boating, water skiing, swimming, fishing, and wildlife viewing. Most of the lake users are from out-of-state.

The lake contains both coldwater and warmwater fish species. Coldwater fish species include rainbow trout, brook trout, brown trout Salmo trutta, and kokanee. Warmwater fish species included largemouth bass, black crappie, pumpkinseed sunfish, green sunfish, yellow perch, channel catfish Ictalurus punctatus, brown bullhead, northern pike, tiger muskie Esox lucius x E. masquinongy, and tench Tinca tinca.

The residents of Hauser Lake have become concerned about the water quality of the lake. In 1988, a comprehensive water quality survey was conducted (Anonymous 1990). The lake was classified as mesotrophic.

Methods

We surveyed Hauser Lake twice during 1992. The first survey took place March 17 and 18 (prior to hatchery rainbow trout being stocked). Sampling effort during the first survey

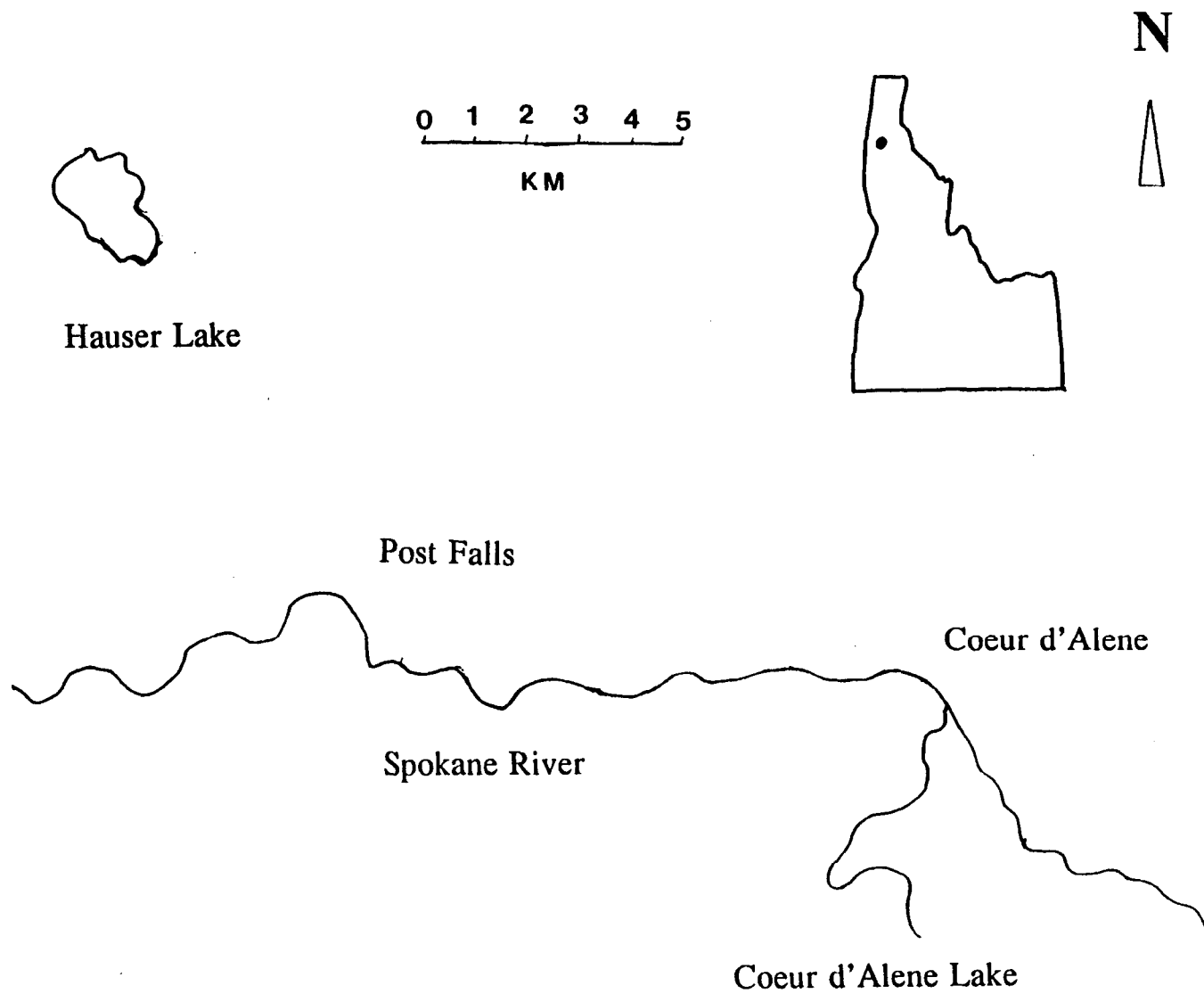


Figure 2. Location of Hauser Lake, Idaho.

totalled 13 combined units (six gill net units, six trap net units, one electrofishing unit). The second survey, July 14 and 15, entailed 13.2 units of combined sampling effort (six gill net units, six trap net units, and 1.2 electrofishing units).

After the first survey and prior to the second survey, 9,000 put-and-take size rainbow trout were stocked in Hauser Lake, and all received adipose fin clips to distinguish them in the creel census and subsequent sampling. These fish were released at an average size of 249 mm. Pectoral spines from channel catfish were collected for ageing purposes; scale samples were taken from other species.

Creel data were collected at the public boat ramp as boating anglers completed their trips and from a roving census that contacted boat and shore anglers at other access points. Creel data were collected from April 1, 1992 to September 11, 1992. The survey was stratified into six, 4-week periods, and each period was further stratified into weekdays, weekend/holidays, and time of day (0700 h to 1100 h, 1200 h to 1600 h, and 1700 h to 2100 h). Three instantaneous counts were made per day during a total of 26 census days. The data was entered into the Creel Census System (Reece et al. 1992) for analysis.

Results

Creel Survey

Anglers fished an estimated 35,392 h of fishing effort (125 h/ha). They caught an estimated 18,192 fish (64 fish/ha) and harvested an estimated 13,639 fish (48 fish/ha) (Table 2 and Appendix C). Stocked rainbow trout (put-and-take and put-grow-and-take fish) comprised 38% of the harvested fish. Return-to-the-creel in 1992 for put-and-take fish was 22.3% (9,000 put-and-take fish were stocked during the creel survey period in 1992).

Yellow perch and black crappie were the most abundant warmwater fish in the angler creel (Table 2). The "other" category was primarily pumpkinseed. Anglers released an estimated 4,501 fish, and most of those fish were probably largemouth bass (Table 2) due to the 300 mm minimum length limit.

Standard Lake Survey

Biologists expended 13.2 units of combined sampling effort (one unit = one hour of electrofishing, one night of trap net, or one night of a gill net set, one floating and one sinking gill net) on July 13-14, 1992. They collected a total of 920 fish; 85% were game fish and 15% were nongame fish (Table 3 and Appendix D). Pumpkinseed sunfish were the most abundant game fish collected (Table 3). Scales from collected pumpkinseed sunfish were aged and the ages ranged 1 to 10 years (Table 3). Yellow perch were the second most abundant species collected. The opercle was used to age the fish. Ages ranged from 1 to 7 years (Table 4).

Table 2. Summary of fishing effort estimates and harvest estimates on Hauser Lake, Idaho, 1992.

Interval	Number Fish Kept	Number Fish Released	Number Fish Caught	Number AD RBT Kept	Number RBT Kept	Number LMB Kept	Number CC Kept	Number Pike Kept	Number Perch Kept	Number Crappie Kept	Number Other Kept	Total Hours Effort	Effort/ha
1	1,572 (1,363)	250 (334)	1,823 (1,432)	214 (275)	1,228 (1,158)	0	0	0	0	0	0	10,780 (4,457)	38
2	2,211 (927)	781 (485)	2,992 (1,054)	235 (235)	716 (544)	150 (175)	0 0	0 0	50 (98)	1,846 (3,286)	731 (681)	9,808 (2,128)	34.5
3	1,754 (1,024)	1,209 (1,254)	2,964 (1,862)	280 (286)	468 (311)	0	482 (362)	0	108 (160)	123 (188)	619 (864)	4,962 (1,162)	17.5
4	876 (538)	969 (1,014)	1,845 (1,270)	374 (392)	314 (373)	36 (76)	36 (81)	0	76 (150)	0	0	4,565 (1,243)	16.1
5	5,762 (6,815)	1,292 (1,093)	7,134 (7,779)	614 (458)	436 (358)	99 (212)	0	0	3,981 (6,896)	141 (289)	474 (755)	3,890 (1,496)	13.7
.p- 6	1,434 (1,668)	0	1,434 (1,668)	287 (475)	0	0	0	0	0	0	0	1,387 (603)	4.9
Season	13,639 (7,299)	4,501 (2,035)	18,192 (8,458)	2,004 (895)	3,162 (1,414)	285 (285)	518 (371)	0	4,215 (6,901)	2,110 (3,304)	1,824 (1,335)	35,392 (5,467)	124.6

AD RBT - adipose-clipped put-and-take rainbow trout

RBT - rainbow trout

LMB - largemouth bass

CC - channel catfish

Table 3. Length range, total weight and age range for fish collected from Hauser Lake, Idaho, July 1992.

Species	Age range	Number collected	Length range (mm)	Total weight (q)
Adipose-clipped rainbow trout	8	260-330	2,810	
rainbow trout	6	290-350	2,155	
brook trout	2	280-350	640	
largemouth bass	149	80-450	22,783	
channel catfish	16	180-370	4,270	2 to 4
black crappie	21	65-290	2,085	2 to 10
yellow perch	170	35-195	14,007	1 to 7
pumpkinseed	296	35-195	14,007	1 to 7
green sunfish	13	40-140	360	2 to 3
brown bullhead	94	140-330	22,558	
tench	145	190-450	117,284	

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Table 4. Mean length of aged fish collected from Hauser Lake, Idaho, July, 1992.

Species	Mean length by										
	0	1	2	3	4	5	6	7	8	9	10
Yellow perch											
N	0	7	11	10	5	3	4	1			
		100	180	218	230	233	240	250			
Range		85-120	125-195	200-230	210-240	210-250	220-255				
Black crappie											
N	0	1	2	2	1	0	0	0	0	0	0
		75	150	195	210						
Range				190-200							
Channel catfish											
N	0	1	9	12							
		165	263	365							
Range			210-310	290-470							
Pumpkinseed											
N	0	1	4	4	17	8	10	7	3	0	1
		75	90	119	132	142	163	171	180	0	190
Range			80-100	110-125	110-160	115-180	140-170	150-190			

The pH of Hauser Lake was 8.35 and the alkalinity ranged from 17 mg/l to 22 mg/l (Table 5). Eighty-two percent of the water volume in Hauser Lake was classified as suitable for trout. This was based on water temperature and dissolved oxygen profiles taken on July 15, 1992 (Table 5).

New Species Evaluation

Biologists collected 22 channel catfish that ranged in age from 2 to 4 years. They were the result of the 1989 (age 4), 1990 (age 3), and 1991 (age 2) stockings. No tiger muskie were collected.

Discussion

Creel Survey

Fishing effort on Hauser Lake (125 h/ha) was similar to or higher than many of the more well-known lake fisheries in Idaho. Fishing effort in Henrys Lake ranged from 41 to 142 h/ha (Mark Gamblin, IDFG, personal communication). Fishing effort in Lake Pend Oreille, Cascade Reservoir, and Ashton Reservoir ranged 11 to 83 h/ha.

Hatchery Stocking Evaluation

Biologists initiated a three-year evaluation of rainbow trout stocked into Hauser Lake. The Department used put-and-take rainbow (200-250 mm in length) and put-grow-and-take rainbow (100-150 mm in length) to provide a salmonid fishery in Hauser Lake. Anglers must harvest at least 40% of the total number of put-and-take rainbow or 100% by weight of the put-grow-and-take rainbow to continue the stocking program. Biologists estimated that anglers harvested 22.3% of the 1992 put-and-take rainbow trout in the first five months after they were stocked. Put-grow-and-take rainbow return will be calculated after the 1993 fishing season. Rainbow trout stocked prior to 1992 as fry, fingerlings, or put-and-take fish provided 61% of the harvested rainbow trout. This indicated rainbow trout do survive and grow in Hauser Lake. In 1993, biologists should be able to make estimates of harvest on 1993 put-and-take fish, 1992 put-and-take holdover fish, 1992 put-grow-and-take fish, and rainbow trout stocked prior to 1992.

Standard Lake Survey

Biologists calculated a proportional stock density (PSD) value of 19 for Hauser Lake largemouth bass (Table 6). Rieman (1983) reported PSD values for nine north Idaho lakes ranging from 6 to 93. Compared to these values, Hauser Lake was the fourth lowest.

Table 5. Limnological data collected on Hauser Lake, Idaho, July, 1992.

Depth	0	1	2	3	4	5	6	7	8	9	10
Temperature °C	19.8	19.8	19.6	19.4	19.2	18.4	15.5	13.2	9.0	7.2	6.6
Dissolved Oxygen mg/l	9.4	9.5	10.2	10.2	10.2	12.1	5.1	1.5	0.4	0.2	0.2
pH	8.35										
Conductivity	25 umhos										
Alkalinity	17 mg/l - 22 mg/l										
Mean Secchi depth	5.5 m										

SEC1 B-1

Table 6. Summary of proportional stock densities (PSD) and relative weights (Wr) for various species of warm water fish in Hauser Lake, Idaho, 1992.

Species	Number collected	PSD	Wr range
largemouth bass	149	19	71 to 125
channel catfish	16	0	87 to 134
black crappie	21	55	63 to 142
yellow perch	170	43	66 to 129
green sunfish	13	0	
pumpkinseed	296	27	
brown bullhead	94	65	

Anderson (1980) suggested largemouth bass PSD values of 40 to 60 indicated a balanced population. PSD values for other species are summarized in Table 6.

PSD values for a balanced population of bass may be lower than the values recommended by Anderson (1980) because of watershed geology, elevation, latitude, or climate. Relative weights (W_r) may be a better indicator of fish population health. Biologists calculated W_r for largemouth bass, black crappie, yellow perch, and channel catfish from Hauser Lake (Table 6). The W_r values indicated that the fish populations were very close to the optimum for most length groups. A 100 value of W_r theoretically indicates a fish population in "...ecological and physiological optimality..." (Nielsen and Johnson 1983). In other words, the fish were growing at an optimum level. However, some of the W_r values were calculated from length groups with less than five fish and may not be an accurate assessment of the true W_r .

New Species Evaluations

Channel catfish provided another dimension to the Hauser Lake fishery. Channel catfish growth appeared to be similar to those reported by Carlander (1969). Cocolalla Lake has produced channel catfish greater than 4 kg at age 6. Hauser Lake could also produce some large fish eventually.

Although biologists did not collect any tiger muskie from Hauser Lake in 1992, there have been several unconfirmed reports of anglers catching tiger muskie. The primary problem with the tiger muskie program has been the quality of the fish being stocked and the time of year they were stocked (late September to November). The hatchery system had put the tiger muskie program on hold until such time as they can produce a healthier, more vigorous fish for release at a more favorable time of year.

With the establishment of northern pike in Hauser Lake, management for a trophy tiger muskie program is more difficult. It is likely that many sub-legal tiger muskie will be harvested as northern pike, and we may not be able to provide a trophy tiger muskie fishery.

Recommendations

1. Continue stocking channel catfish when available.
2. Conduct a creel survey to monitor harvest of stocked salmonids and to determine return-to-the-creel for put-and-take and put-grow-and-take rainbow trout.
3. Continue the tiger muskr stocking program with improved quality fingerlings. Evaluate the program in the fut 3 to see if a trophy fishery can be established.

COCOLALLA LAKE

Description of Study Area

Cocolalla Lake (326 ha) offers both warmwater and coldwater fishing. Hatchery rainbow trout have historically supported the majority of fishing effort on Cocolalla Lake. In 1985, channel catfish were introduced, and in 1992, competed with rainbow trout as the species of choice. The put-and-take rainbow trout management program for Cocolalla Lake consisted of approximately 8,000 fish annually. This stocking began in March after the ice has left the lake and continued through June each year. The channel catfish program was initiated with an initial stocking of 15,272 fingerling catfish in 1985. Subsequent stockings occurred in 1987 with 2,044 juvenile channel catfish; 1988 with 4,980; 1989 with 10,000; and 8,000 juvenile channel catfish in both 1990 and 1991. No channel catfish were stocked in 1986 or 1992 due to lack of availability.

Methods

We surveyed Cocolalla Lake twice during 1992. The first survey took place March 9 through March 12 (prior to hatchery rainbow trout being stocked). Sampling effort during the first survey totaled 11.7 combined units (6 gill net units, 4 trap net units, 1.7 electrofishing units, 3 trap units, and 2 trot line units). The second survey, July 8-10, entailed 17.23 units of combined sampling effort (11 gill net units, 3 trap net units, and 1.23 electrofishing units).

After the first survey and prior to the second survey, 8,090 put-and-take size rainbow trout were stocked in Cocolalla Lake, and all received adipose fin clips to distinguish them in the creel census and subsequent sampling. These fish were released at an average size of 249 mm. Pectoral spines from channel catfish were collected for ageing purposes, and scale samples were taken from other species.

Creel data were collected at the public boat ramp as boating anglers completed their trips and from a roving census that contacted boat and shore anglers at other access points. Creel data were collected from April 9, 1992 to September 6, 1992. The survey was stratified into six, 4-week periods, and each period was further stratified into weekdays, weekend/holidays, and time of day (0700 h to 1100 h, 1200 h to 1600 h, and 1700 h to 2100 h). Fifty-seven instantaneous counts were made during a total of 27 census days. The data was entered into the Creel Census System (Reece et al. 1992) for analysis.

Results

During the combined sampling periods, nine game fish species and four non-game species of fish were captured (Appendix E). A total of 18 channel catfish were collected during the first sampling period and 121 during the second. All of the first 18 channel catfish had a pectoral spine removed. None of these fish were captured again during the second sampling period. Channel catfish in the combined catch ranged from 170 mm to 640 mm in

length. The largest fish, 640 mm, weighed 3.5 kg. Although channel catfish are not expected to reproduce naturally in north Idaho waters, one of the catfish sampled was a mature female with fully developed eggs. Age analysis of pectoral spine samples revealed a wide size range of fish in the same year class. Channel catfish ranging from 370 mm to 640 mm were aged at 8+, the 1985 year class.

Our sample of rainbow trout included 30 non-adipose-clipped rainbow trout and 63 adipose-clipped rainbow trout in the July survey period. Fifteen rainbow trout were sampled during the first survey in March. Of these, nine were identified as holdover hatchery fish and six as wild rainbow trout.

Creel census results (Appendix F) indicated that the primary fishery on Cocolalla Lake is for rainbow trout. During the census period, April through September, 133 anglers were interviewed, of which 60, or 45.3%, were in pursuit of rainbow trout. Channel catfish anglers came in second at 29.7% (40 anglers). Fourteen of the interviewed anglers (10.9%) were fishing for "whatever they could catch." Bass anglers accounted for 9.4% of the effort. Rainbow trout comprised the majority of the catch at 48.9%, of which 14.8% were adipose-clipped fish from the 1992 stockings. Channel catfish accounted for 15.9% of the total catch, yellow perch 23.9%, and 11.4% included brown bullhead, cutthroat trout, brook trout, and brown trout. No largemouth bass or black crappie were seen during the creel census. Resident anglers comprised 85.7% of the sample and non-residents 14.3%. Bank anglers were 58% of the survey and boat anglers 42%. Average trip length was 2.47 h. Estimated angling effort on Cocolalla Lake for the period April 4 through September 6 was 8,877 h (+/- 1,754 h at 95% C.I.) or 27 h/ha. The greatest fishing pressure occurred during the month of June with an estimated 2,286 h of effort (7 h/ha). Catch rates for rainbow trout reached a high of 0.63 fish/h in May. Channel catfish catch rates peaked in August with 0.4 fish/h being caught. Harvest estimates during the survey period were 625 adipose-clipped rainbow trout (+/- 788 at 95% C.I.) or 1.9 fish/ha, 586 non-adipose-clipped rainbow trout (+/- 580 at 95% C.I.) or 1.8 fish/ha, and 379 channel catfish (+/- 308 at 95% C.I.) or 0.9 fish/ha.

Additional information on the Cocolalla Lake fish community, such as back-calculation of length at age from scale and spine samples, had not yet been summarized and will be presented in 1993.

Discussion

Fishing pressure on Cocolalla Lake was relatively light when compared to other north Idaho lakes of similar size. Two other area lakes, Hauser Lake and Spirit Lake, were also the focus of creel censuses in 1992. Hauser Lake received the greatest fishing pressure with 140 h/ha from April to September 1992. Spirit Lake saw 54 h/ha of effort, and Cocolalla Lake received only 27 h/ha of fishing pressure during the same time period. The fishing pressure on Cocolalla Lake was mainly directed at rainbow trout and channel catfish. During the census period, the fishing effort expended on channel catfish was likely underestimated due to the amount of fishing that took place after dark. The majority of catfish anglers started fishing after 200' and continued until 0400 h or later the next day. These anglers were not well represented the census. The estimate of 379 channel catfish being harvested from Cocolalla Lake from April to September 1992 was probably on the low side.

Return-to-the-creel of the adipose-clipped put-and-take rainbow trout stocked in 1992 was 7.7% (625 out of 8,090). This return was well below the goal of 40% established in the five-year fisheries management plan; however, it was still too early to fully evaluate the put-and-take rainbow program for Cocolalla Lake. The results from our planned 1993 survey will indicate the survival of put-and-take rainbow trout and their potential further contribution to the trout fishery on Cocolalla Lake.

Recommendations

1. Continue with the stocking program of approximately 8,000 put-and-take rainbow trout annually in Cocolalla Lake.
2. Continue with the stocking program of approximately 8,000 channel catfish annually in Cocolalla Lake, as they are available.
3. Further quantify the level of fishing effort for channel catfish on Cocolalla Lake by conducting limited creel surveys during the late evening and early morning hours.
4. Conduct a second Lowland Lakes Standard Survey on Cocolalla Lake in 1993 to estimate the survival of adipose-clipped put-and-take rainbow trout stocked in 1992.

SHEPHERD LAKE

Description of Study Area

Shepherd Lake (40.5 ha) is located approximately 2 km southeast of Sagle, Idaho. Shepherd Lake was one of the north Idaho lakes selected for new species introductions. The introduction of tiger muskie and bluegill *Lepomis macrochirus* to Shepherd Lake first occurred in 1989 when 350 tiger muskie and 300 bluegill were released. In 1990, another 352 tiger muskie and 11,500 bluegill were stocked. No bluegill were available in 1991, but 105 tiger muskie and approximately 140,000 (seven gallons) gamarus shrimp were stocked.

Methods

On June 10 and 11, 1992, we surveyed Shepherd Lake to evaluate the success of the new species introductions. The combined sampling effort directed at Shepherd Lake amounted to 4.6 units. This included two gill net units (one unit equals one floating and one sinking gill net fished for one night); two trap net units (one unit equals one trap net fished for one night); and 0.6 units of electrofishing effort (one unit equals one hour of electrofishing). Examination of littoral vegetation was made in search of gamarus shrimp.

Results

Sampling efforts yielded the capture of one tiger muskie, 490 mm in length, weighing 710 g. No bluegill or gamarus shrimp were sampled. Four other species of fish were sampled in addition to the three target species listed above (Appendix G).

Additional information on Shepherd Lake fish populations, such as back-calculation of length at age from scale samples, has not yet been summarized and will be presented in 1993.

Discussion

The success of the tiger muskie program in Shepherd Lake was so far limited. The one tiger muskie captured was stocked in 1991 and exhibited good growth. There had been reports of near legal and legal size muskie (30 inches and larger) being caught in Shepherd, but to date none of these reports had been verified. The primary problem with the tiger muskie program has been the quality of the fish being stocked and the time of year they were stocked (late September - November). The hatchery system had put the tiger muskie program on hold until such time as they can produce a healthier, more vigorous fish for release at a more favorable time of year.

While no bluegill were sampled, it does not mean that they did not persist in the system. Similar problems have occurred with the bluegill introduction as has with the tiger muskie stockings, in that the health of the fish was not as good as it could have been. The 1990 release of bluegill in north Idaho also included releases of fish into several other area lakes. One release site was Dawson Lake. There was a reported loss of approximately 5,000 of the 9,000 bluegill released in Dawson Lake. The hauling mortality associated with this release could have had the same effect or worse on the 11,500 bluegill released in Shepherd Lake in 1990. This would have left us with minimal numbers of fish in the system, and the population may still be building.

As with the bluegill, the gamarus shrimp introduction in Shepherd may take another year or two to make itself apparent.

Recommendations

1. Continue stocking tiger muskie in Shepherd Lake. Stocking rate and size at release would be based on availability and proven success in other states.
2. Shepherd Lake should be surveyed again in four to five years to monitor the growth and survival of the introduced species.

DAWSON LAKE

Description of Study Area

Dawson Lake (14.2 ha) is located approximately 6.5 km north of Moyie Springs, Idaho. The IDFG purchased Dawson Lake and surrounding land (200 acres total) in 1970. In 1989, Dawson Lake was one of the north Idaho lakes selected for new warmwater species introductions. Bluegill sunfish (130 fish), tiger muskie (75 fish), and channel catfish (2,000 fish) were first stocked in 1989 and then again in 1990 (9,000 fish, 110 fish, and 2,000 fish respectively). In 1990, approximately 160,000 gammarus shrimp (eight gallons) were also introduced. An additional 2,000 channel catfish were added to Dawson Lake in 1991.

Methods

We surveyed Dawson Lake on June 9 and 10, 1992 to evaluate the success of the new species introductions. The combined sampling effort directed at Dawson Lake amounted to 4.65 units. This included two gill net units (one unit equals one floating and one sinking gill net fished for one night); two trap net units (one unit equals one trap net fished for one night); and 0.65 units of electrofishing effort (one unit equals one hour of electrofishing). Examination of littoral vegetation was made in search of gammarus shrimp. Scale samples taken from the fish were used to determine ages, with the exception of the channel catfish where we use pectoral spines. The spines were sectioned and placed under a dissecting microscope for reading.

Results

Our sampling efforts on Dawson Lake resulted in the capture of all of the target species, with the exception of gammarus shrimp. Other species sampled during the sampling are listed in Appendix H. We captured one channel catfish 370 mm in length weighing 520 g. This fish was from the 1989 stocking (age 4, determined by a sectioned pectoral spine). Two tiger muskie were collected during the sampling efforts, which measured 460 mm and 560 mm in length weighing 600 g and 950 g, respectively. In addition, 17 bluegill ranging from 100 mm to 200 mm were collected. Readings from scale samples taken from the bluegill indicated three age classes; 2-, 3-, and 4-year-old fish. The 3- and 4-year-old fish are from the original stockings in 1989 and 1990, but the 2-year-old fish collected would have to be from natural reproduction in Dawson Lake. No gammarus shrimp were observed in Dawson Lake.

Additional information on Dawson Lake fish populations, such as back-calculation of length at age from scale samples, had not yet been summarized and will be presented in 1993.

Discussion

Dawson Lake is one of the more popular lakes in Boundary County, providing a year-round fishery. The introduction of the new species to Dawson Lake had provided a diversity that no other lowland lake in north Idaho had to offer. With the natural reproduction of bluegill in Dawson, their future looks very bright.

The channel catfish were growing as well, if not better than, could be expected in our north Idaho waters. The 370 mm channel catfish we collected in Dawson Lake was as large, at age 4 + as channel catfish in Cocolalla Lake are at age 6 + and older.

The two tiger muskie we sampled in Dawson Lake were from the 1990 stocking and still under the 76 cm minimum size limit. Tiger muskie from the 1989 stocking would just have started to enter the legal size range in 1992. We would expect the tiger muskie in Dawson Lake to enter the harvest size range at age 3 to 4 based on their growth rate.

While providing a unique opportunity with the introduced species, the other spiny-ray fish in the system were also contributing to the fishery. Largemouth bass in the lake can exceed 460 mm and weigh over 1.5 kg. The black crappie fishery was one of the more renowned in the area, with numerous catches of fish in the 250 mm range.

Recommendations

1. Maintain the present management direction. Continue to stock channel catfish and tiger muskie in Dawson Lake when available.
2. When gammarus shrimp are available in the future, Dawson Lake should be stocked again.

SPIRIT LAKE

Description of Study Area

Spirit Lake (585 ha) accommodated a two-story fishery comprised of salmonids and spiny-rayed fish. Kokanee salmon supported the majority of the fishing effort, with rainbow trout coming in a distant second. The kokanee fishery on Spirit Lake was considered to be one of the best in the region, providing angling opportunity year-round. This kokanee population had demonstrated highly variable year class strengths and was supplemented from 1984 through 1988 in an effort to moderate the fluctuation. Kokanee stocking was discontinued in 1988. Rainbow trout were stocked in Spirit Lake as both the put-and-take and put-grow-and-take size.

Methods

In 1992, we conducted two Lowland Lakes Standard Surveys on Spirit Lake. The first survey took place March 30 through April 1, 1992 prior to the stocking of rainbow trout for 1992. Sampling effort at this time totaled 13.5 combined units (5.5 gill net units, 6 trap net units, and 2 electrofishing units). The second survey, July 15-17, 1992, included 9.7 units of combined sampling effort (5 gill net units, 4 trap net units, and 0.7 electrofishing units). One unit equals one floating and one sinking gill net fished for one night or one trap net fished for one night or one hour of electrofishing.

In 1992, 7,000 put-and-take size rainbow were stocked in Spirit Lake. All received adipose fin clips to distinguish them in the creel census and subsequent sampling. These fish were stocked in April, May, and June at an average size of 252 mm. On October 21, 1992, 45,000 domestic Kamloops rainbow trout fingerlings were stocked in Spirit Lake. None of these fish were marked. We will survey Spirit Lake again in 1993 to assess the growth and survival of both groups of fish.

Creel data were collected at the public boat ramp as boating anglers completed their trips and from a roving census that contacted boat and shore anglers at other access points. Creel data was collected from April 1 to September 30, 1992. The survey was stratified into six, 4-week periods, and each period was further stratified into weekdays, weekend/holidays, and time of day (0700 h to 1100 h, 1200 h to 1600 h, 1700 h to 2100 h). Sixty instantaneous counts were made of the number of fishing boats and shore anglers during a total of 24 census days. The data were entered into the Creel Census System (Reece et al. 1992) for analysis.

Results

Sampling effort from the post-stocking survey in July resulted in the capture of 15 non-adipose-clipped rainbow trout and two adipose-clipped rainbow trout. We sampled various other species of fish as well (Appendix I). The non-adipose-clipped rainbow trout sampled ranged from 170 mm to 660 mm. The larger fish in this sample (500 mm and greater) were likely from a domestic kamloop stocking of 20,160 fingerlings in 1987. These fish had converted to a piscivorous diet and were utilizing kokanee as forage. The adipose-clipped fish sampled were from the 1992 stocking and ranged from 250 mm to 260 mm. Their mean size at the time of release was 252 mm. Subsequent sampling in 1993 will provide information on growth and survival of both the put-and-take and put-grow-and-take stockings.

Creel census data (Appendix J) showed that the primary fishery on Spirit Lake was for kokanee. From April through September of 1992, 308 anglers were interviewed, of which 214, or 69.5%, were in pursuit of kokanee. Anglers fishing for "whatever they could catch" came in second at 14.5%. Anglers specifically in search of rainbow trout and cutthroat trout were in third place at 8.4%. Bass anglers came in last at 7.6%. Kokanee comprised the majority of the catch at 95.6%, rainbow trout 1.24% (0.37% adipose-clipped and 0.87% non-adipose-clipped), cutthroat trout 1.46%, largemouth bass 0.03%, and black crappie 0.47%. Approximately 18.5% of the kokanee anglers creeled the daily possession limit of 25 fish. Resident anglers comprised 79.9% of the sample, non-residents 20.1 %. Bank anglers were

into deep open water immediately. Releases prior to 1992 took place at the public boat ramp on the northeast end of Spirit Lake. Reevaluate return-to-the-creel.

2. Stocking of put-and-take rainbow trout should be reduced from the past requests of 10,000 fish (2,000 fish/month, March-June) to 4,000 fish (1,000 fish/month, March-June). If the March stocking is delayed, it should not be made up for in April by stocking 2,000 fish. Stock put-and-take rainbow at the public boat ramp only. Reevaluate return-to-the-creel.
3. The daily possession limit of kokanee from Spirit Lake should remain at 25 fish. Annual kokanee trawling on Spirit Lake should be continued to monitor the population and provide a continuum to the north Idaho lakes data set.

JEWEL LAKE

Description of Study Area

Jewel Lake is a 11.6 ha body of water located 7.3 km west of Westmond, Idaho. An ephemeral outlet flows north from Jewel Lake approximately 3 km to the Pend Oreille River. In 1989, Jewel Lake was renovated to remove an unwanted population of yellow perch and was restocked in 1990 with westslope cutthroat trout and Henrys Lake rainbow x cutthroat trout hybrids. Low numbers of kokanee salmon were also stocked to provide diversity to the fishery. In 1990, 2,500 fingerling cutthroat trout, 300 adult cutthroat trout, 5,625 rainbow x cutthroat hybrid fingerlings, and 3,000 kokanee fry were stocked in Jewel Lake. The 1991 stocking program consisted of 2,500 fingerling cutthroat, 2,540 hybrid fingerlings, and 3,133 kokanee fry.

The lake was currently managed with special regulation, two fish limit, none under 14 inches (356 mm) in length, and artificial lures and barbless hooks.

Methods

On June 8 and 9, 1992, we sampled Jewel Lake with gill nets, trap nets, and electrofishing equipment. A total of five combined gear sampling units were employed. These consisted of two gill net units (one unit equals one floating and one sinking gill net fished overnight), two trap net units (one unit equals one trap net fished overnight), and one unit of electrofishing (one unit equals one hour of electrofishing).

Results

Our sampling efforts yielded catches of cutthroat trout, rainbow x cutthroat hybrids, and yellow perch (Appendix K). A total of 122 cutthroat trout were captured, ranging in size from 140 mm to 340 mm with a mean length of approximately 250 mm (Figure 3). Three age

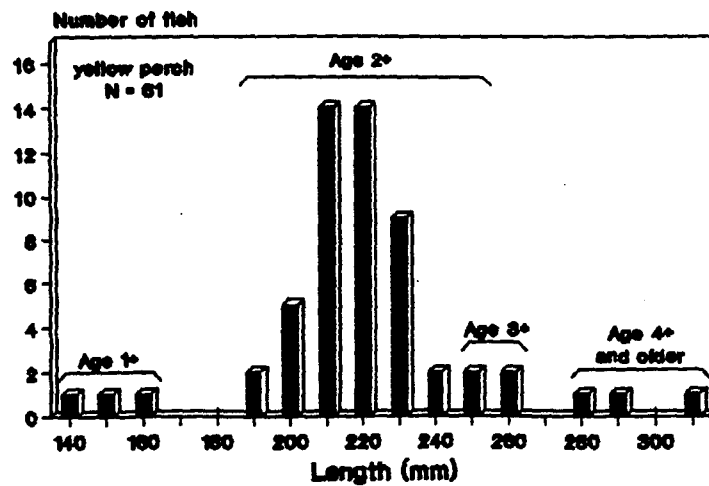
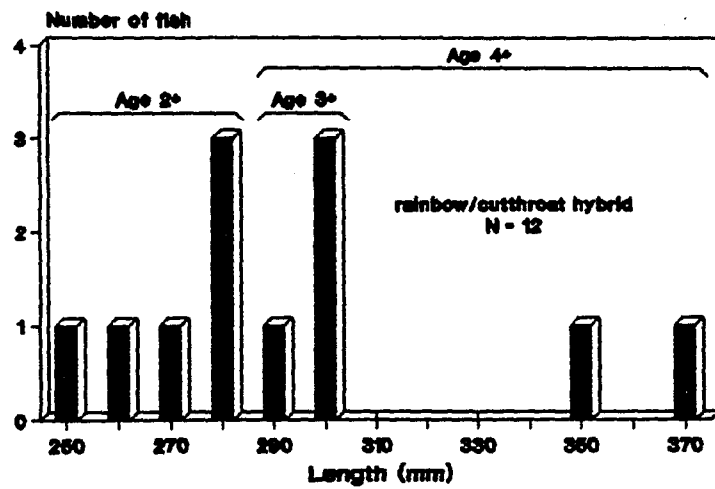
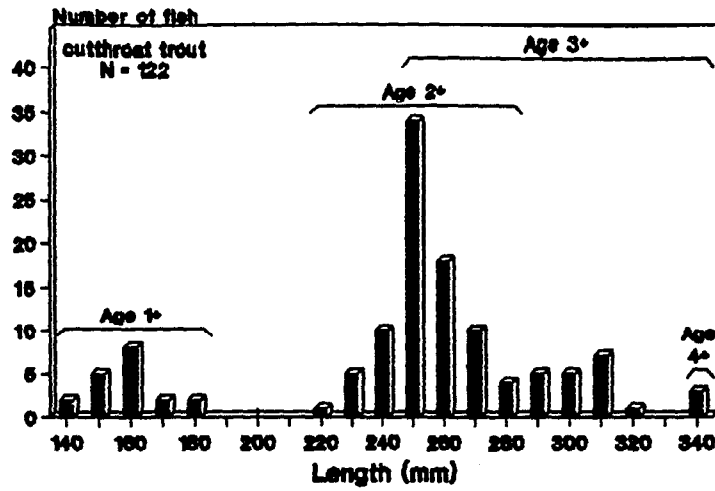


Figure 3. Length frequency distribution of cutthroat trout, rainbow x cutthroat hybrid trout, and yellow perch sampled with gill nets, trap nets, and electrofishing from Jewel Lake, June 8 and 9, 1992.

classes, 1 + to 4+, were represented in the cutthroat trout sample. A total of 12 rainbow x cutthroat hybrids were sampled, ranging from 250 mm to 370 mm with a mean length of approximately 290 mm. Age distribution in the rainbow x cutthroat sample were the same as the rainbow, 2 + to 4 + (Figure 3). No kokanee were sampled during the survey. Sixty-one yellow perch, ranging in size from 140 mm to 310 mm, were captured during the sampling effort (Figure 3). Analysis of opercular bone samples show the perch to be from 1 + to 3 + years of age.

Additional information on Jewel Lake fish populations, such as back-calculation of length at age from scale samples, had not yet been summarized and will be presented in 1993.

Discussion

The presence of yellow perch in Jewel Lake presents the question of their origin. It is possible that when the lake was renovated in 1989 that all the yellow were not killed and the few remaining fish have produced successive year classes. The second possibility is that yellow perch were illegally introduced after the renovation. In either case, they were doing quite well in 1992. The size and condition factor of the yellow perch in Jewel Lake was better than most other yellow perch populations in north Idaho. With the artificial lure regulation on Jewel Lake in 1992, it is doubtful that many of these fish would be harvested by anglers. In a few years the yellow perch would not only offer direct competition with the salmonids in Jewel Lake, but would soon overpopulate themselves and begin to stunt.

From the length frequency distribution of the cutthroat and rainbow x cutthroat hybrids in Jewel Lake (Figure 3), it is possible that the yellow perch were already competing directly and impeding the growth needed to support a quality trout fishery. Another answer to the lack of large trout in Jewel Lake was harvest of undersize fish. In either case, there are some management decisions that need to be made concerning Jewel Lake.

Management options for Jewel Lake include:

1. Maintain the current quality trout management. Open the lake to consumptive harvest in 1994, then treat the lake in 1995. Reopen the lake in 1996 and stock with westslope cutthroat fingerlings and surplus cutthroat and rainbow broodstock. Discontinue stocking of kokanee and rainbow x cutthroat hybrids.
2. Manage the lake as a year-round trout only fishery similar to Mirror Lake. Same treatment and restocking schedule as option 1. Maintain the lake with fingerling stocking of cutthroat, brook trout, and rainbow.
3. Manage the lake as a balanced two-story fishery. Establish largemouth bass, black crappie, and bluegill sunfish, and supplement with channel catfish, tiger muskie, and put-and-take rainbow trout. Open to year-round fishing.

Recommendations

1. Solicit public input on management options for Jewel Lake at public meetings on fishery regulations.
2. Solicit angler opinion during creel census of Jewel Lake fishery.
3. Increase enforcement efforts on Jewel Lake to discourage the use of bait and the harvest of undersize trout.

McARTHUR RESERVOIR

Introduction

McArthur Reservoir is located four miles south of Naples, Idaho in the Deep Creek drainage, a tributary to the Kootenai River. The current lake area of approximately 243 ha was increased from a previous 81 ha in 1965 by the construction of a new concrete and earth fill dam. This structure replaced an old earth fill dam. The primary management goal for McArthur Reservoir is waterfowl production.

Historically, McArthur Reservoir provided trophy brook trout fishing. In 1958, a 6-pound, 10-ounce brook trout was caught in McArthur Reservoir. This fish held the state record until 1972. A remnant run of rainbow trout still persist as well in Deep Creek in limited numbers. For the most part, the fishery in McArthur Reservoir consists of yellow perch, pumpkinseed sunfish, and largemouth bass.

Methods

On April 28, 1992, we electrofished McArthur Reservoir. During 36 minutes of effort with a Smith-Root electrofishing boat, 90 yellow perch, 31 pumpkinseed, 19 largemouth bass, 1 wild rainbow trout (320 mm), 1 brook trout (290 mm), and 5 brown bullhead (220 - 240 mm) were collected (Figure 4).

Discussion

McArthur Reservoir was in an advanced stage of eutrophication. Various methods of controlling aquatic vegetation had been considered to improve access for boat fishermen. We discounted chemical applications because of the threat to waterfowl utilizing the system, as well as irrigation and domestic water usage downstream from McArthur Reservoir. Mechanical removal was not feasible because of the large area impacted by the vegetation.

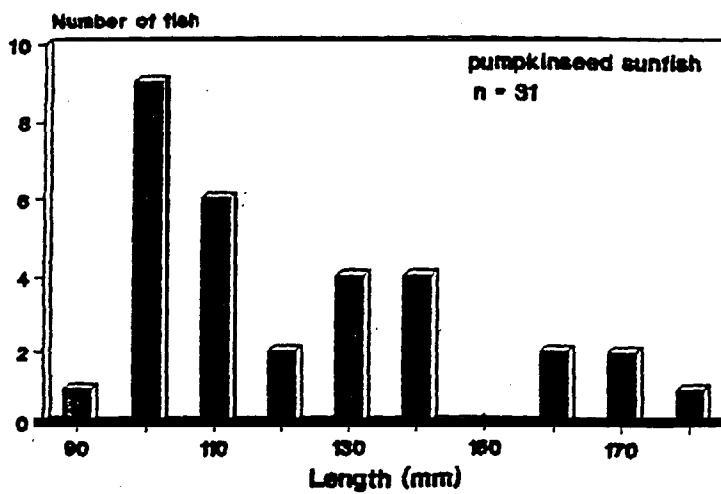
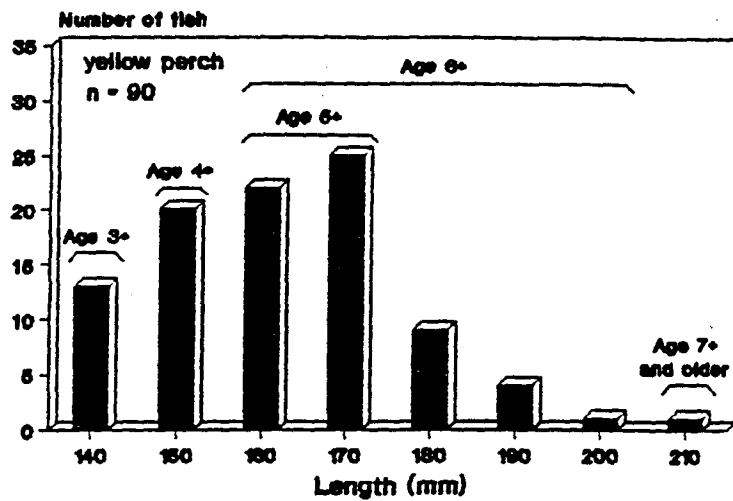
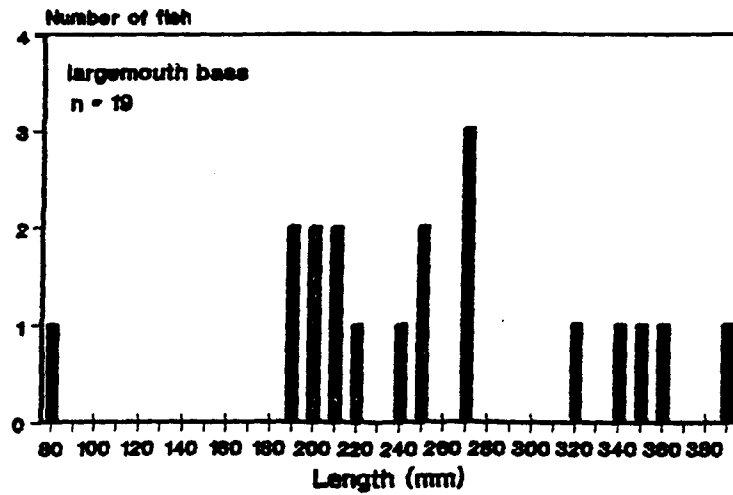


Figure 4. Length frequency distribution of largemouth bass, yellow perch, and pumpkinseed sunfish, with age distribution of yellow perch, electrofished from McArthur Reservoir, April 28, 1992.

Physical control of the vegetation by winter drawdown was the remaining option. Winter drawdown designed to expose the vegetation to killing sub-zero temperatures was not practical in McArthur Reservoir due to the bog nature of the substrate and the inability to drop the reservoir water level low enough to be of benefit. Sufficient moisture would be retained in the substrate to sustain the rooted vegetation throughout the winter period, and snow cover would provide an insulating blanket sufficient to protect the vegetation. Refill of the system would need to begin early in the spring with the first runoff to assure adequate nesting habitat for waterfowl. With the possibility of another drought year, the prospect of not being able to refill the reservoir presents a major concern. We concluded that McArthur Reservoir was beyond aquatic vegetation rehabilitation at this time.

Control of yellow perch numbers in McArthur Reservoir would be limited to the use of cove rotenone applications. The effectiveness of this procedure in McArthur Reservoir would likely not reduce perch numbers sufficiently to allow for increased growth of the remaining perch.

Recommendations

1. No action be taken to control aquatic vegetation in McArthur Reservoir.
2. No action be taken to control yellow perch numbers in McArthur Reservoir.
3. Construct a fish ladder at McArthur Dam to allow passage of upstream migrating trout.

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APPENDICES

Appendix A. Idaho Department of Fish and Game - Lowland Lakes Standard Survey.

I. Surveys will be conducted using the following standardized gear:

- A. Gill Nets
Floating and sinking monofilament nets, 150' x 6' with six panels composed of 3/4", 1", 1 1/4", 1 1/2" 2", and 1 1/2" bar mesh. One floating and one sinking net combined fished overnight equals one unit of gill net effort.
- B. Trap Nets
75' lead, 3' x 6' frame, crowfoot throats on first and third of five hoops, 3/4" bar mesh, treated black. One trap net fished overnight equals one unit of trap net effort.
- C. Electrofishing A pulsed D.C. electrofishing boat with boom-mounted electrodes. One hour of current-on electrofishing equals one unit of electrofishing effort.

II. Surveys will be conducted using the following procedures:

- A. Effort
Due to the selectivity of individual gear types, a combination of gillnetting, trapnetting, and electrofishing effort will be used to characterize the fish community. One unit of effort for each of the gear types, combined, equals one unit of "sampling effort." The following table provides guidelines for the minimum amount of sampling effort and survey time needed for various size waters:

Lake size (ac)	^a Units of sampling Effort	Nights needed
1 -25	1	1
26 - 100	2	1
101 - 500	4	1-2
501 - 1000	6	2
^b 1000		

^aOne unit of "sampling effort" includes a pair of floating and sinking gill nets and one trap net fish overnight and one hour of electrofishing.

^bUse best judgement on sampling effort needed to sample various habitat zones.

Sampling effort should be expended over a range of representative habitats available. Additional gear-specific sampling effort may be conducted to increase sample size for some species. Likewise, certain gear-specific effort may be reduced to minimize potentially large catches. Catch and size data must be recorded separately for each gear type to allow calculation of catch and size structure per standardized unit of "sampling effort." On a water specific basis, after surveying with combined gears, one gear type may be dropped if it is found to be wholly ineffective in sampling.

B. Periodicity

A standardized lowland lake survey need not be repeated annually, but should be repeated at least every 5-7 years depending on the suspected status of the fish community. Certainly, more in-depth surveys using these or additional methods may be conducted at any time.

Sampling during the pre-spawn period for warmwater species enhances the catch of larger individuals and may minimize logistic problems in drawdown reservoirs. Sampling at least one month post-spawning minimizes daily variability in catch of warmwater species and reduces biased sex distribution. Fall sampling optimizes the catch of young-of-the-year. For larger waters, sampling in two seasons may be warranted. Select what you feel is the most appropriate sampling period for the lake and be consistent.

Appendix B. Lower Twin Lake - Lake Survey Report. Lower

Twin Lake - Narrative

Lower Twin Lake is located approximately three miles north of Rathdrum, Idaho. The Twin Lakes system consist of two distinct basins separated by a shallow channel. The lakes were formed when Fish Creek, the inlet to the upper lake, was dammed by a glacial moraine approximately 10,000 years ago.

In April 1992, the Idaho Department of Fish and Game conducted a survey of Lower Twin Lake to assess of the size and condition of kokanee salmon in the lake. We also investigated the possibility of introducing smallmouth bass into Lower Twin Lake.

The surface area of Lower Twin Lake is approximately 391 acres. Average depth in Lower Twin Lake is 22.7 feet and maximum depth is 62.7 feet. Lower Twin Lake has very little or no dissolved oxygen in its deep water for the better part of the year. Measurements taken in April showed the level of dissolved oxygen available at a depth of 30 feet had already fallen below what a trout requires. This condition, created by man's activities in the watershed, limits the amount of useable area for all species of game fish in Lower Twin Lake. Development along the shoreline of Lower Twin Lake is primarily residential with more than 280 lake front homes. Two summer camps and a golf course complex also share the shoreline of Lower Twin Lake. There is only one public boat ramp on Lower Twin Lake, located behind the Lightning Bar. Two other public access points are available on the Twin Lakes system; one located at the east end of the channel connecting Upper and Lower Twin lakes, and one on Upper Twin Lake just west of the Lake Park Resort.

Lower Twin Lake supports a diverse warm and coldwater fishery. Warmwater fish species present in the lake include largemouth bass, black crappie, yellow perch, pumpkinseed sunfish, green sunfish, northern pike, and brown bullhead. Green sunfish and northern pike, are recent illegal introductions. The primary coldwater fishery consists of put-and-take rainbow trout. Cutthroat trout, rainbow/cutthroat trout hybrids, brook trout, brown trout, and kokanee salmon are also present, along with tench. The trout fishery is supplemented annually with stockings of approximately 9,000 put-and-take rainbow trout and varying numbers of cutthroat trout and brown trout as they are available.

Our management goal for kokanee salmon in Lower Twin Lake is to provide a few large fish to the angler that would be counted in their six-fish trout limit. With the stocking regime used in 1983 through 1986 of less than 3,000 kokanee salmon fry annually being released in Lower Twin Lake, we did achieve that goal. Our sampling efforts on Lower Twin Lake in 1992 yielded several kokanee in excess of 20 inches and weighing over 2.3 pounds. These larger kokanee salmon are 5 to 6 years old before they spawn. Angler reports indicate that these large kokanee salmon can be caught while trolling for trout in Lower Twin Lake. In 1987, we began to increase the number of kokanee salmon stocked annually in Lower Twin Lake. In 1987, 9,990 kokanee salmon were stocked, in 1989, 10,000, and in 1990 through 1992 approximately 105,000 kokanee salmon annually were planted in Lower Twin Lake. We hope to be able to provide not only large kokanee salmon to anglers in Lower Twin Lake but a few more of these larger kokanee salmon with this increase in stocking numbers.

The idea of introducing smallmouth bass into Lower Twin Lake has been rejected. Due to the illegal introduction of not only northern pike but green sunfish as well, we feel that smallmouth bass would not do well in this system. Green sunfish are a direct competitor with smallmouth bass. In a small system such as Lower Twin Lake, this competition would not allow the smallmouth bass to grow to a legal size of 12 inches.

92-DJRPT

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

FISH COMMUNITY CHARACTERISTICS

LAKE/RESERVOIR NAME: Lower Twin Lake REGION: 1 DATE: 4/12/92 ^{9,15,23}

Catch Per Unit* of Combined Gear Sampling Effort 14,43 units/3 = 4.81

SPECIES	LENGTH - RANGE(mm)	No.	%	Wt. (kg)	%
RBT	130 - 690	16.22	8		
CTT	340 - 390	1.04	1	0.400	
BK	290 -	0.21	>1		
KoK	160 - 560	0.62	>1	0.5178	
LMB	40 - 510	33.47	17	3.617	
BC	160 - 280	4.57	2		
PE	100 - 310	76.51	39		
PS	70 - 180	58.63	30		
GS	110 - 160	1.25	1		
NP	460 -	0.21	>1		
BBH	210 - 270	0.62	>1		
GAME FISH SUBTOTAL:		193.35	99.6		
Tench	430 - 460	0.83	>1		
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
NON-GAME FISH SUBTOTAL:		0.83	>1		
ALL SPECIES TOTAL:		194.18	100%		100%

* one hour electrofishing, one trap net night, and one combined floating and sinking gill net night.

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Rainbow Trout LAKE/RESERVOIR: Lower Twin Lake

DATE: 4/9, 15, 23/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349	0.07	1				
50-59							350-359	0.07	1				
60-69							360-369	0.07	1				
70-79							370-379						
80-89							380-389		2				
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139	0.07	1					430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219	0.07	1					510-519						
220-229	0.21	4					520-529						
230-239	0.21	4					530-539						
240-249	0.62	12					540-549						
250-259	0.28	5					550-559						
260-269	0.21	4					560-569						
270-279	0.07	1					570-579	0.14	2				
280-289	0.07	1					580-589						
290-299							590-599						
300-309													
310-319	0.14	2					690-699	0.07	1				
320-329	0.07	1											
330-339							TOTAL	5.41	47				

TOTAL CATCH PER EFFORT OF: GILL NET 18 ELECTROFISHING 60 TRAP NET -

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Catfish LAKE/RESERVOIR: Lower Twin

DATE: 4/9, 15, 23/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349	0.14	40				
50-59							350-359						
60-69							360-369	0.07	20	485			I
70-79							370-379	0.07	20	430			M
80-89							380-389						
90-99							390-399	0.07	20	585			I
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	0.35	100				

TOTAL CATCH PER EFFORT OF: GILL NET 5 ELECTROFISHING 0 TRAP NET 0

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Brook Trout LAKE/RESERVOIR: Lower Twin Lake

DATE: 4/9, 15, 23/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
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220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299	0.07	100					590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	0.07	100				

TOTAL CATCH PER EFFORT OF: GILL NET 1 ELECTROFISHING - TRAP NET -

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CH COMPOSITION OF: (species) Nokouel LAKE/RESERVOIR: C. Twink

DATE: 4/9, 15, 23/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169	0.07	33	41		2	I	460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539	0.07	33	1400		5	I
240-249							540-549						
250-259							550-559						
260-269							560-569	0.07	33	1050		6	M
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	0.21	100	830			

TOTAL CATCH PER EFFORT OF: GILL NET 3 ELECTROFISHING 0 TRAP NET 0

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

FISH COMPOSITION OF: (species) Largemouth Bass LAKE/RESERVOIR: L. Twin

DATE: 4/9, 15, 23/92

PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	♀ I/M
40-49	0.07	>1						340-349							
50-59								350-359							
60-69	0.07	>1						360-369	0.07	>1					
70-79								370-379							
80-89								380-389							
90-99								390-399							
100-109	0.14	1						400-409	0.07	>1					
110-119	0.07	>1	13	81				410-419							
120-129	0.14	1						420-429	0.07	>1	1250	110			
130-139	0.07	>1						430-439							
140-149	0.14	1	33	97				440-449	0.07	>1	1400	106			
150-159	0.42	4						450-459							
160-169	0.21	2						460-469							
170-179	0.83	8	50	79				470-479							
180-189	0.76	7						480-489							
190-199	1.04	9	50	56				490-499							
200-209	1.32	12	75	71				500-509	0.07	>1	2400	121			
210-219	0.97	9	110	89				510-519	0.07	>1	2500	N/V			
220-229	1.18	11						520-529							
230-239	0.90	8						530-539							
240-249	0.55	5	160	84				540-549							
250-259	0.49	4	180	83				550-559							
260-269	0.35	3						560-569							
270-279	0.35	3	210	76				570-579							
280-289	0.21	2	290	93				580-589							
290-299	0.14	1	340	98				590-599							
300-309	0.14	1	415	107				600-609							
310-319	0.07	>1						610-619							
320-329	0.14	1	450	95				620-629							
330-339								TOTAL	11.16	100	179				

TOTAL CATCH PER EFFORT OF: GILL NET 1 ELECTROFISHING 159 TRAP NET 0

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

FISH COMPOSITION OF: (species) Black Crappie LAKE/RESERVOIR: Lower Twin Lake

DATE: 4/9, 15, 23/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169	0.28	18	69	110			460-469						
170-179	0.14	9					470-479						
180-189	0.07	5					480-489						
190-199							490-499						
200-209	0.21	14	100	70			500-509						
210-219	0.14	9					510-519						
220-229	0.28	18	180	101			520-529						
230-239	0.21	14	200	97			530-539						
240-249							540-549						
250-259	0.14	9					550-559						
260-269							560-569						
270-279							570-579						
280-289	0.07	5	300	77			580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	1.52					

TOTAL CATCH PER EFFORT OF: GILL NET 15 ELECTROFISHING 6 TRAP NET 1

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Yellow Perch LAKE/RESERVOIR: Lower Twin

DATE: 4/9, 15, 23/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109	0.07	>1					400-409						
110-119	0.42	2					410-419						
120-129	0.42	2					420-429						
130-139	0.21	1					430-439						
140-149	0.83	3	33	94	2+	M	440-449						
150-159	0.69	3					450-459						
160-169	0.21	1					460-469						
170-179	0.42	2	67	102	2+	M	470-479						
180-189	1.11	4	88	111	2+	M	480-489						
190-199	2.01	8	83	88	3+	M	490-499						
200-209	1.87	7					500-509						
210-219	1.18	5	115	88	3+	M	510-519						
220-229	1.52	6	140	93	5+	M M	520-529						
230-239	0.21	1					530-539						
240-249	0.14	>1	150	75	5+	M	540-549						
250-259	0.07	>1	190	83	5+	M	550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319	0.14	>1					610-619						
320-329							620-629						
330-339							TOTAL	25.50	22				

TOTAL CATCH PER EFFORT OF: GILL NET 131 ELECTROFISHING 235 TRAP NET 2

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Pumpkin seed LAKE/RESERVOIR: Lower Twin
DATE: 4/9, 15, 23/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79	0.07	21					370-379						
80-89	0.21	1					380-389						
90-99	0.14	21					390-399						
100-109	0.07	21					400-409						
110-119	0.69	4					410-419						
120-129	0.49	2	38			I	420-429						
130-139	1.04	5	45			I	430-439						
140-149	0.83	4	56			I	440-449						
150-159	0.69	4	69			I	450-459						
160-169	0.28	1					460-469						
170-179	0.14	21					470-479						
180-189	0.14	21					480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	19.94	24				

TOTAL CATCH PER EFFORT OF: GILL NET 31 ELECTROFISHING 227 TRAP NET 24

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

TCH COMPOSITION OF: (species) Green Sunfish LAKE/RESERVOIR: Lower Twin

DATE: 4/9, 15, 23/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119	0.14	33					410-419						
120-129							420-429						
130-139							430-439						
140-149	0.14	33					440-449						
150-159	0.17	17					450-459						
160-169	0.17	17					460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	0.42	100				

TOTAL CATCH PER EFFORT OF: GILL NET 0 ELECTROFISHING 5 TRAP NET 1

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Northern Pike LAKE/RESERVOIR: Lower Twin Lak.

DATE: 4/9, 15, 23/92

PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469	0.07	100				
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	0.07	100				

TOTAL CATCH PER EFFORT OF: GILL NET 1 ELECTROFISHING — TRAP NET —

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Brown Bullhead LAKE/RESERVOIR: Lower Town Lak.

DATE: 4/9, 15, 23/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	♀ I/M
								340-349							
50-59								350-359							
60-69								360-369							
70-79								370-379							
80-89								380-389							
90-99								390-399							
100-109								400-409							
110-119								410-419							
120-129								420-429							
130-139								430-439							
140-149								440-449							
150-159								450-459							
160-169								460-469							
170-179								470-479							
180-189								480-489							
190-199								490-499							
200-209								500-509							
210-219	0.07	33						510-519							
220-229								520-529							
230-239								530-539							
240-249	0.07	33						540-549							
250-259								550-559							
260-269								560-569							
270-279	0.07	33						570-579							
280-289								580-589							
290-299								590-599							
300-309								600-609							
310-319								610-619							
320-329								620-629							
330-339								TOTAL	0.21	100					

TOTAL CATCH PER EFFORT OF: GILL NET 3 ELECTROFISHING - TRAP NET -

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Tench LAKE/RESERVOIR: Lower Twin Lake

DATE: 4/9, 15, 23/92 PERIOD: i

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439	0.07	25				
140-149							440-449						
150-159							450-459						
160-169							460-469	0.07	25				
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	0.28	50				

TOTAL CATCH PER EFFORT OF: GILL NET 0 ELECTROFISHING 2 TRAP NET 2

Appendix C. Hauser Lake - Creel census report.

Angler Summary Report
Idaho Department of Fish and Game

Body of Water: HAUSER LAKE

EPA Number:

Angler Composition
Percent of resident: 81.88%
Percent of non-resident: 18.12%

Catching:		Percentage of Anglers: Releasing:		Harvesting:	
0:	52.09%	0:	0.00%	0:	0.00%
1:	13.95%	1:	19.51%	1:	26.28%
2:	8.14%	2:	15.85%	2:	14.74%
	7.21%	3:	17.07%	:	15.38%
4:	6.05%	4:	14.63%	4:	11.54%
5:	1.86%	5:	4.88%	5:	4.49%
more than 6:	10.70%	more than 6:	28.05%	6:	27.56%

Type of Fishing (from Instantaneous Counts)

Boat: 34.32%
Bank: 62.18%
Tube: 0.54%
Ice: 2.96%

Method of Fishing

Bait: 87.81%
Lure: 11.92%
Fly: 0.27%

Catch Composition			
AD-RBT :	14.04%	RBT :	21.43%
LMB:	2.22%	CC:	2.46%
PIKE:	0.00%	PE:	21.43%
BO:	26.11%	OTHER:	12.2%

Number of Completed trips: 104
Average Trip Length: 3.14

Idaho Department of Fish and Game
Creel Survey System
Pressure Report by Interval and Daytype
Summary

Body of Water: HAUSER LAKE
1992

EPA Number:

SECTION NUMBER	INTERVAL	DAYTYPE	BOAT ANGLERS HOURS	BANK ANGLERS HOURS	TUBE ANGLERS HOURS	ICE ANGLERS HOURS	TOTAL ANGLERS HOURS
1	1	Weekday	3297	3413	0	0	6710
		Weekend	1792	2176	102	0	4070
	Interval 1 totals:		5089	5589	102	0	10780
	+/- at 95% C.I.:		3960	2043	96	0	4457
1	2	Weekday	4030	2240	0	0	6270
		Weekend	2357	1180	0	0	3538
	Interval 2 totals:		6387	3420	0	0	9808
	+/- at 95% C.I.:		1968	809	0	0	2128
1	3	Weekday	594	2469	0	0	3063
		Weekend	619	1280	0	0	1899
	Interval 3 totals:		1213	3749	0	0	4962
	+/- at 95% C.I.:		465	1064	0	0	1162
1	4	Weekday	1721	1564	0	0	3285
		Weekend	768	512	0	0	1280
	Interval 4 totals:		2489	2076	0	0	4565
	+/- at 95% C.I.:		1066	639	0	0	1243
1	5	Weekday	1493	1244	0	249	2987
		Weekend	249	441	0	213	903
	Interval 5 totals:		1742	1685	0	462	3890
	+/- at 95% C.I.:		1239	652	0	528	1496
1	6	Weekday	853	533	0	0	1387
		Weekend	853	533	0	0	1387
	Interval 6 totals:		853	533	0	0	1387
	+/- at 95% C.I.:		213	564	0	0	603
Section 1 totals:			17773	17052	102	462	35392
+/- at 95% C.I.:			4742	2667	96	528	5467
Season totals:			17773	17052	102	462	35392
+/- at 95% C.I.:			4742	2667	96	528	5467

Idaho Department of Fish and Game
Creel Survey System
Summary for Catch Rate by Day Type and Interval - for total hours

Body of Water: FUSER LAKE

EPA Number:

SECTION I

SECTION I														
ICATCHRATEICATCHRATEICATCHRATEICATCHRATEICATCHRATEICATCHRATEICATCHRATEICATCHRATEICATCHRATEICATCHRATEICATCHRATEICATCHRATEICATCHRATEICATCHRATE														
NUMBER {		INTERVAL	DAYTYPE	KEPT	RELEASED	CRUSHT	AD-RBT	RBT 1	LMB 1	CC	PIKE	PE	IBC	OTHER
1	1	Weekday	0.147	0.013	0.160	0.027	0.128	0.800			0.000			0.000
		Weekend	0.144	0.040	0.184	0.010		0.000		0.000				0.000
	2	Weekday	0.211	0.032	0.243	0.024	0.073	0.016	0.000	0.000	0.008	0.243	0.089	
		Weekend	0.251	0.164	0.415	0.024	0.073	0.014	0.000	0.000	0.000	0.091	0.049	
	3	Weekday	0.404	0.303	0.707	0.061	0.061	0.000	0.081	0.000	0.020	0.040	0.202	
		Weekend	0.272	0.148	0.420	0.049	0.148	0.000	0.123	0.000	0.025	0.008	0.000	
	4	Weekday	8.23 ³⁹	0.295	0.534	0.114	0.068	0.011	0.011	0.000	0.023	0.000	0.000	
		Weekend	0.071	0.000	0.071	0.000	0.071	0.000	0.000	0.000	0.000	0.000	0.000	
	5	Weekday	1.667	0.333	2.017	0.117	8.083	0.033	0.000	0.000	1.317	0.000	0.117	
		Weekend	0.900	0.329	1.228	0.294	0.208	0.000	0.000	0.000	0.052	0.156	0.128	
	6	Weekday	1.034	0.000	1.034	0.207				0.000	0.000	0.000	0.000	
		Weekend	0.000	0.000	0.000	0.000				0.080	0.000	0.000	0.000	
	7	Weekday	0.000	0.000	0.000			0.000	0.000	0.000	0.000	0.000	0.000	
		Weekend	0.000	0.000	0.000			0.000	0.000	0.000	0.000	0.000	0.000	
	8	Weekday	0.000	0.000	0.000	0.000	0.000	8.000	0.000	0.000	8.000	0.000	0.000	
		Weekend	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Section	1 weekday Catchrate:		0.463	0.122	0.587	0.069	0.051	0.008	0.012	0.000	0.171	0.035	0.051	
Section	1 weekend Catchrate:		0.205	0.085	0.090	0.047	0.076	0.002	0.015	0.000	0.010	0.031	0.023	
Section	1 season Catchrate:		0.389	0.111	0.532	0.063	0.058	0.006	0.013	0.000	0.125	0.034	0.043	
Weekday Season Catchrate:			0.463	0.122	0.587	0.069	0.051	0.008	0.012	0.000	0.171	0.035	0.051	
Weekend Season Catchrate:			0.205	0.085	0.036	0.047	0.076	8.002	0.015	0.080	0.010	0.031	0.023	
Average season catchrate:			0.389	0.111	0.502	0.063	0.058	0.006	0.013	8.000	0.125	0.834	0.043	

Idaho Department of Fish and Base Creel
Survey System
Summary for Harvest by Section and Interval - for total hours

Body of Water: HALISER LAKE
1992

EPA Number:

SECTION I	INTERVAL	DAYTYPE	NUMBER OF FISH		NUMBER OF TONS		NUMBER OF WEIR		RBT	L18	NUMBER OF INUD		NUMBER OF EER	NUMBER OF 1ER	NUMBER OF 1ER	NUMBER OF 1ER
			KEPT	RELEASED	CA	N	KEPT	KEPT			ICC	PIKE	PE	BC	OTHER	KEPT
1	1	Weekday	386	87	1874	181	885	8	8	8	8	8	0	8	8	8
	Weekend		586	163	749	33	423	8	8	0	0	8	8	0	8	0
	Interval 1	Totals:	1572	258	1823	214	1228	0	8	8	8	8	8	8	8	a
	+/- at 95% C.I.:		1363	334	1432	275	1158	8	a	8	8	8	0	0	0	0
1	2	Weekday	1323	291	1524	150	458	188	8	8	8	8	1524	58	173	58
	Weekend		888	588	1468	85	258	5e	0	8	8	8	22	173	173	173
	Interval 2	Totals:	2211	781	2992	235	716	150	A	8	8	58	1846	731	731	731
	+/- at 95% C.I.:		927	485	1054	235	544	175	8	0	98	386	681	681	681	681
1	3	Weekday	1237	928	2166	187	187	8	248	8	61	12.3	619	8	619	8
	Weekend		517	281	798	93	281	0	234	A	47	A	8	8	8	8
	Interval 3	Totals:	1754	1289	2964	288	468	8	482	8	108	123	619	8	619	8
	+/- at 95% C.I.:		1824	1254	1862	286	311	8	362	8	168	188	864	864	864	864
1	4	Weekday	785	969	1754	374	2233	36	36	8	76	0	8	8	8	8
	Weekend		91	0	91	0	91	8	8	8	8	0	8	8	0	a
	Interval 4	Totals:	876	969	1845	374	314	36	36	8	76	a	8	8	8	8
	+/- at 95% C.I.:		538	1814	1278	392	373	76	81	0	152	0	0	0	0	0
1	5	Weekday	4979	995	6025	349	248	99	0	8	3934	a	349	125	349	125
	Weekend		813	297	1189	265	188	8	0	0	47	141	125	125	125	125
	Interval 5	Totals:	5792	1292	7134	614	436	99	8	8	3981	141	474	125	474	125
	+/- at 95% C.I.:		6815	1293	7775	458	18	212	8	8	6896	289	755	755	755	755
1	6	Weekday	1434	0	1434	237	8	8	8	8	8	8	8	8	8	8
	Weekend		8	8	8	8	8	8	8	8	8	8	8	8	8	0
	Interval 6	Totals:	1434	8	1434	287	8	8	0	8	8	8	8	8	8	0
	+/- at 95% C.I.:		1668	8	1668	475	8	8	8	A	8	8	8	8	8	8
1	7	Weekday	3	0	8	a	8	8	8	8	8	0	0	0	0	0
	Weekend															
	Interval 7	Totals:														
	+/- at 95% C.I.:															

Idaho Department of Fish and Game
Creel Survey System
Summary for Harvest by Section and Interval - for total hours

Body of Water: H U B LAKE
1992

EPA Number:

SECTION	INTERVAL	DAYTYPE	HIJRB FISH	ILBER RE1.EISEL CIBET	1 TOTAL KEPT	IMBED NUPBTER	INY83ER LIB	IW11BER CC	MJ 8EER	1NI PE	HUGER BC	IHDIBER DTJER
HIJ8ER			KEPT	KEPT	KEPT	KEPT	KEPT	KEPT	KEPT	KEPT	KEPT	KEPT
1	7	Weekend	8 B		8	8	0 0	3	0 8	0		
	Interval	7 Totals:	0 0		8	0	8 8	0	8 0	0	0	0
	+/- at 95% C.I.:		8 8		0	8	8 0	8	8 8	0	0	0
1	8	Weekday	0 2		8	8	0 0	8	0 0	0	0	0
	Weekend		8 2		0	0	0 0	8	8 0	0	0	B
	Interval	8 Totals:	3 3		0	0	2 8	8	0 8	0	8	8
	+/- at 95% C.I.:		8 3		0	0	0 8	8	8 8	8	0	0
Section: 1 Totals:			13639 4581	18192	2884	3162 285	518	0	4215	2110	1824	
+/- at 95% C.I.:			7299 2825	8458	895	1414 285	371	0	6901	3334	1335	
Season Totals:			13639 4501	18192	2304	3162 285	518	0	4215	2110	1824	
+/- at 95% C.I.:			7299 2035	8458	895	1414 285	371	0	6901	3383 4	1335	

Appendix D. Hauser Lake - Lake Survey Report.

Hauser Lake - Narrative

Hauser Lake is located approximately 15 miles northwest of Coeur d'Alene, Idaho. The western shore is about a mile from the Idaho-Washington state border. Hauser Lake is about 625 acres in surface area and has an average depth of 21 feet and a maximum depth of approximately 40 feet. The immediate shoreline of Hauser Lake is equally divided between forests and meadows, with about 25% of it developed for lake shore residences. Hauser Lake has two public access points. One is located on the north shore and one on the south shore. Both public areas have boat ramps and are owned and maintained by the Idaho Department of Fish and Game and Kootenai County. During the mid to late summer period, Hauser Lake stratifies (thermal layering) where colder, more dense water is near the bottom of the lake and resists mixing with warmer layers near the surface. When the lake is in this period of stratification, dissolved oxygen levels drop to near zero in water deeper than 20 feet and water temperatures in the epilimnion (top 15 feet of warmer water) often exceed 70°F. This limits the usable area for trout to that portion of the lake between 15 feet and 20 feet below the surface. This narrow band is called the thermocline.

In 1992, the Idaho Department of Fish and Game conducted a fisheries survey and angler creel survey on Hauser Lake to assess the fishery. Our fishery survey entailed the use of gill nets, trap nets, and electrofishing, along with trot lines and slat traps. Eleven species of game fish and one non-game species were found during the survey. Game fish sampled included rainbow trout, brook trout, largemouth bass, channel catfish, black crappie, yellow perch, pumpkinseed sunfish, green sunfish, northern pike, walleye, and brown bullhead. The non-game fish found during the survey was tench. One fish that was absent from the survey, that we expected to see, was tiger muskie. The tiger muskie were first introduced to Hauser Lake in 1989 and then again in 1990. Both stockings consisted of 1,650 4- to 6-inch fingerlings. Channel catfish were introduced at the same time. In 1989 10,000 fingerling catfish were stocked and in 1990 another 8,000 fingerlings were planted. Channel catfish found during our sampling exceeded 15 inches in length and weighed over 1 1/4 pounds. Three other recently introduced species of fish are the green sunfish, the northern pike and the walleye. These three species are unlawful introductions. Only one walleye was sampled and this fish was killed to hopefully eliminate them from the system. The northern pike and green sunfish were sampled in sufficient numbers to indicate that reproducing populations already exists in Hauser Lake. While a very aggressive fish, the green sunfish offers little angler attraction due to it's small size. The northern pike is a very desirable game fish but it's presence in Hauser Lake may have an adverse impact on the tiger muskie program in Hauser Lake.

Information gathered from the angler creel census shows a minimum of 35,000 hours of fishing effort took place on Hauser Lake between April and August of 1992. During that time 18,000 fish were caught, 13,000 of these fish were harvested. Rainbow trout are the most sought after species of fish accounting for 35 percent of the catch in Hauser Lake. Black crappie and yellow perch came in second and third with 26 percent and 21 percent of the catch.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
COVER SHEET

LAKE/RESERVOIR NAME: HAUSER LAKE REGION: 1

DATE: 7-15-1992 SAMPLE CREW: J.A. Davis

SCALE ENVELOPE NUMBERS: _____ TO _____

SAMPLING CONDITIONS:

Water Temp. (°C @ .5 m): 19.5 Air Temp. Range (°C): 23.8 to _____

Secchi Range (m): 5.0 to 6.0

Wind (may circle more than one): 0-10 10-20 20+ mph

N NE E SE S SW W NW

SAMPLING EFFORT:

Combined floating and sinking gill net: 6 nights

Electrofishing: 1.2 hours; trap net: 6 nights

Other (including add'l size selective sampling): _____

SAMPLING LOCATIONS:

Draw or attach a lake/reservoir map and indicate fisheries and limnological sampling locations; footnoting with narrative if necessary.

KEY:



Trap Net

S-X Secchi reading



Gill Net (F,S,FS)

TDO-X Surface/bottom and
profile readings



Electrofishing

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

WATER AREA CHARACTERISTICS

Lake/Reservoir Name: HAUSER LAKE Region: 1

Date: 7/15/92 Person Completing Form: J. A. DAVIS

Hydrological Unit: 17010305 Catalogue No.: 030101

Type of Water: ☒ Natural ☐ Man-made ☐ Impounded Natural

Full Pool: Volume 13,085.4 (acre ft.) Area 625 (acres)

Elevation 2,187 (ft.) Maximum Depth 40 (ft.)

Mean depth 21 (ft.)

Minimum Pool: Volume 12,815.9 (acre ft.) Elevation _____ (ft.)

Inflow 5,680

Mean Annual Inflow (or Outflow): 7,500 (acre ft.)

Trophic Status: ☐ Oligotrophic ☒ Mesotrophic ☐ Eutrophic MEI($\sqrt{\text{TDS}/d}$): _____

Shoreline Length: 6.4 (km)

Approximate % Shoreline in:

<u>25</u>	<u> </u>	<u> </u>	<u>40</u>	<u>35</u>
Urban	Agriculture	Range	Forest	Wetland

Approximate % Shoreline Ownership: 1 99
Federal State Private

Known Winter Kills?: ☒ No ☐ Yes _____
(years)

Littoral Zone Substrate:

 + 30 + + + 70 = 100%
Bedrock Boulder/Rubble Gravel Sand Silt/Mud/Detritus

Littoral Zone Cover: Total _____ %

 + 4 + 30 + 66 = 100%
Large Organic Debris Docks Boulder/Rubble Vegetation

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

LIMNOLOGICAL CHARACTERISTICS
(To be measured during July 20-Sept. 10 period.
Measurement locations to be indicated on file map.)

LAKE/RESERVOIR NAME: HAUSER LAKE REGION: 1

DATE: 7-15-92 PERSON COMPLETING FORM: J. A. DAVIS

MINIMUM DATA SET:

pH: 8.35 Total alkalinity (ppm): High 258
surface bottom Low (5)
 surface bottom
 170mg/l - 22mg/l

Conductivity (μ mhos): 25
surface

Secchi (m): 5.0, 5.5, 6, 5.35 = 5.46
location 1 location 2 location 3 location 4 mean

Temperature and D.O. profile:
(measured at 1-m increments or 10 depth intervals)

Temperature ($^{\circ}$ C): 19.8 19.8 19.6 19.4 19.2 18.4 15.5 13.2 9.0 7.2 6.6

D.O. (ppm): 9.4 9.5 10.2 10.2 10.2 12.1 5.1 1.5 0.4 0.2 0.2

Depth (m): 1.5 1 2 3 4 5 6 7 8 9 10

Volume of trout habitat ($<21^{\circ}$ C, >5 ppm D.O.): 13,310,400 m³

Trout habitat as a percent of full pool volume: 82 %

OPTIONAL ADDITIONAL DATA: 7-83 DEQ STUDY

Chlorophyll a (μ g/L): 2.4 Total phosphates (mg/L): 0.5m - 17.0
5.0m - 18.0
10.0m - 134.0

T.D.S. (mg/L): Nitrate nitrogen (mg/L):

Zooplankton (no/L $>$): 266

Ammonia $\text{NH}_3\text{-N}$ (μ g/l) - 37
Nitrate-Nitrite (μ g/l) - 24

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

FISHERIES CHARACTERISTICS

YEAR: 1992 PERIOD SURVEYED: APRIL-AUGUST 1992
EXPANDABLE: NO (YES) ; FOR PERIOD: SAME
HOURS OF EFFORT: TOTAL - 35,392 PER ACRE - 56.6
TOTAL CATCH RATE: 0.502 TOTAL HARVEST RATE: 0.39
HARVEST: NO. PER ACRE - 21.8 POUNDS PER ACRE -

SPECIES COMPOSITION (%) OF HARVEST BY NUMBER:

SPECIES:	<u>Adelp BBT</u>	<u>RBT</u>	<u>LMB</u>	<u>Channel Cat</u>	<u>Perch</u>	<u>N. Pike</u>
%:	<u>14.7</u>	<u>23.2</u>	<u>2.1</u>	<u>3.8</u>	<u>30.9</u>	<u>0</u>
SPECIES:	<u>Black Crappie</u>	<u>Other</u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
%:	<u>15.5</u>	<u>13.4</u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

YEAR: PERIOD SURVEYED:
EXPANDABLE: NO YES ; FOR PERIOD:
HOURS OF EFFORT: TOTAL - PER ACRE -
TOTAL CATCH RATE: TOTAL HARVEST RATE:
HARVEST: NO. PER ACRE - POUNDS PER ACRE -

SPECIES COMPOSITION (%) OF HARVEST BY NUMBER:

SPECIES:	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
%:	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
SPECIES:	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
%:	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

YEAR: PERIOD SURVEYED:
EXPANDABLE: NO YES ; FOR PERIOD:
HOURS OF EFFORT: TOTAL - PER ACRE -
TOTAL CATCH RATE: TOTAL HARVEST RATE:
HARVEST: NO. PER ACRE - POUNDS PER ACRE -

SPECIES COMPOSITION (%) OF HARVEST BY NUMBER:

SPECIES:	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
%:	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
SPECIES:	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
%:	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

FISH COMMUNITY CHARACTERISTICS

LAKE/RESERVOIR NAME: HAUSER LAKE REGION: 1 DATE: 7/15/92

Catch Per Unit* of Combined Gear Sampling Effort

SPECIES	LENGTH - RANGE(mm)	No.	%	Wt. (kg)	%
Adiposeless RBT	260 - 330	0.62	0.9	0.22	1.5
RBT	290 - 350	0.46	0.7	0.17	1.1
Brook Trout	280 - 310	0.15	0.2	0.05	0.3
LMB	80 - 450	11.5	16.3	1.75	11.8
C. CATFISH	180 - 370	1.2	1.7	0.32	2.2
B. Crappie	65 - 290	1.62	2.3	0.16	1.1
Perch	35 - 250	13.07	18.6	0.32	2.2
Pumpkinseed	30 - 195	22.7	32.3	1.08	7.3
Greensunfish	40 - 140	1.0	1.4	0.03	0.2
B. Bullhead	140 - 330	7.2	10.3	1.74	11.7
	-				
GAME FISH SUBTOTAL:		59.55	84.6	5.84	39.3
TENCH	190 - 450	10.84	15.4	9.02	60.7
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
NON-GAME FISH SUBTOTAL:		10.84	15.4	9.02	60.7
ALL SPECIES TOTAL:		70.39	100%	14.86	100%

* one hour electrofishing, one trap net night, and one combined floating and sinking gill net night.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
AGE AND GROWTH SUMMARY SHEET

LAKE/RESERVOIR NAME: HAUSER LAKE REGION: 1

DATE OF COLLECTION: 7-15-92

SPECIES PERCH mean

Age group	Number aged	Back calculated length (mm) at each annulus							Length at capture
		I	II	III	IV	V	VI	VII	
0	0								
I	7								100
II	11								180
III	10								218
IV	5								230
V	3								2
VI	4								2
VII	1								250
Average length									
Number aged									

SPECIES: Black Crappie mean

Age group	Number aged	Back calculated length (mm) at each annulus							Length at capture
		I	II	III	IV	V	VI	VII	
0	0								
I	1								75
II	2								150
III	2								195
IV	1								
8	1								270
9	2								287
VII 10	1								290
Average length									
Number aged									

SPECIES: Channel catfish mean

Age group	Number aged	Back calculated length (mm) at each annulus					Length at capture
		I	II	III	IV	V	
0							
I							
II	1						165
III	9						210 - 310 263
IV	12						290 - 470 365
V							
VI							
VII							
Average length							
Number aged							

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
AGE AND GROWTH SUMMARY SHEET

LAKE/RESERVOIR NAME: HAUSER LAKE REGION: 1

DATE OF COLLECTION: 7-15-92

SPECIES Northern Pike collected 3/92 MEAN

Age group	Number aged	Back calculated length (mm) at each annulus							Length at capture
		I	II	III	IV	V	VI	VII	
0									
I									
II									
III									
IV									
V									
VI	1								
VII	1								
Average length									610
Number aged									980

SPECIES: Pumpkinseed Sunfish MEAN

Age group	Number aged	Back calculated length (mm) at each annulus						Length at capture
		I	II	III	IV	V	RANGE	
0								
I	1							75
II	4						80 - 100	90
III	4						110 - 125	119
IV	17						110 - 160	132
V	8						115 - 180	142
VI	10						140 - 170	163
VII	7						150 - 190	171
Average length		III 3						180
Number aged		X 1						190

SPECIES: Green Sunfish MEAN

Age group	Number aged	Back calculated length (mm) at each annulus							Length at capture
		I	II	III	IV	V	VI	VII	
0									
I									
II	6								113
III	1								110
IV									
V									
VI									
VII									
Average length									
Number aged									

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Channel Catfish LAKE/RESERVOIR: HAUSER LAKE

DATE: 7-15-92 PERIOD: _____

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349	0.08	6.4				
50-59							350-359	0.08	6.4				
60-69							360-369	0.08	6.4	470	107		
70-79							370-379	0.08	6.4	610	128		
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189	0.23	18.4	40	87			480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239	0.08	6.4	110	108			530-539						
240-249							540-549						
250-259							550-559						
260-269	0.08	6.4	150	105			560-569						
270-279							570-579						
280-289							580-589						
290-299	0.15	1.2	270	124			590-599						
300-309	0.15	1.2	220	91			600-609						
310-319	0.08	6.4	360	134			610-619						
320-329	0.08	6.4	340	114			620-629						
330-339	0.08	6.4	380	115			TOTAL	1.25		2,950			

TOTAL CATCH PER EFFORT OF: GILL NET 15 ELECTROFISHING 0 TRAP NET 1

CATCH COMPOSITION OF: (species) LARGemouth BASS LAKE/RESERVOIR: HAUSER LAKE

DATE: 7-15-92

PERIOD:

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	♀ I/M
								340-349							
50-59								350-359							
60-69								360-369							
70-79								370-379							
80-89								380-389							
80-99	.31	2.7	8	96				390-399							
100-109	.77	6.6	15	125				400-409							
110-119	.92	7.9	16	100				410-419							
120-129	.38	3.3	23	110				420-429							
130-139	.23	2.0						430-439	.08	.7	1300	106			
140-149								440-449	.08	.7	1400	106			
150-159	.23	2.0	30	71				450-459	.08	.7	1300	92			
160-169	1.08	9.3	51	98				460-469							
170-179	.62	5.3	61	97				470-479							
180-189	1.15	9.9	70	92				480-489							
190-199	.92	7.9	86	96				490-499							
200-209	.46	4.0	113	107				500-509							
210-219	.53	4.6	120	97				510-519							
220-229	.46	4.0	150	104				520-529							
230-239	.15	1.3	160	96				530-539							
240-249	.31	2.7	190	100				540-549							
250-259	.92	7.9	216	100				550-559							
260-269	.15	1.3	260	106				560-569							
270-279	.31	2.7	280	105				570-579							
280-289	.31	2.7	305	98				580-589							
290-299	.31	2.7	360	103				590-599							
300-309	.23	2.0	420	108				600-609							
310-319								610-619							
320-329	.31	2.7	460	97				620-629							
330-339	.31	2.7	585	111				TOTAL	11.6	100	7989				

TOTAL CATCH PER EFFORT OF: GILL NET 26 ELECTROFISHING 123 TRAP NET 0

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Black Crappie LAKE/RESERVOIR: HAUSER LA

DATE: 7-15-92 PERIOD: _____

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99	0.77	47.5	5	63			390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159	0.15	9.3	46	100			450-459						
160-169	0.15	9.3					460-469						
170-179							470-479						
180-189							480-489						
190-199	0.08	4.9	120	119			490-499						
200-209	0.08	4.9	170	142			500-509						
210-219							510-519						
220-229	0.08	4.9	180	109			520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269	0.15	9.3					560-569						
270-279	0.08	4.9	300	92			570-579						
280-289							580-589						
290-299	0.08	4.9	490	118			590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	1.62	100	1311			

TOTAL CATCH PER EFFORT OF: GILL NET 8 ELECTROFISHING 7 TRAP NET 6

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Pumpkinseed LAKE/RESERVOIR: HAUSER LAKE

DATE: 7-15-92 PERIOD: _____

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99	8.0	35.1	12				390-399						
100-109	1.31	5.6	15				400-409						
110-119	1.77	7.8	27				410-419						
120-129	1.62	7.1	34				420-429						
130-139	2.38	10.4	59				430-439						
140-149	1.69	7.4	57				440-449						
150-159	2.54	11.1	74				450-459						
160-169	1.31	5.6	93				460-469						
170-179	1.38	6.1	110				470-479						
180-189	0.46	2.0	125				480-489						
190-199	0.31	1.4	155				490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	228	100				

TOTAL CATCH PER EFFORT OF: GILL NET 44 ELECTROFISHING 211 TRAP NET 41

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Greensunfish LAKE/RESERVOIR: HAUSER LAKE

DATE: 7-15-92 PERIOD: _____

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99	0.23	23	5				390-399						
100-109	0.08	8					400-409						
110-119	0.31	31	25				410-419						
120-129	0.08	8	48				420-429						
130-139	0.15	15					430-439						
140-149	0.15	15	40				440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	1.0	100	118			

TOTAL CATCH PER EFFORT OF: GILL NET 2 ELECTROFISHING 6 TRAP NET 5

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Yellow Perch LAKE/RESERVOIR: HAUSER LAKE

DATE: 7-15-92 PERIOD: _____

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99	5.0	383	9	129			390-399						
100-109	1.92	147	13	108			400-409						
110-119	1.46	11.2	16	100			410-419						
120-129	0.23	1.8	21	100			420-429						
130-139							430-439						
140-149							440-449						
150-159	0.08	0.6	41	93			450-459						
160-169	0.31	2.4	56	104			460-469						
170-179	0.85	6.5	61	92			470-479						
180-189	0.62	4.7	72	91			480-489						
190-199	0.69	5.3	75	79			490-499						
200-209	0.15	1.2	100	90			500-509						
210-219	0.23	1.8	113	87			510-519						
220-229	0.69	5.3	138	91			520-529						
230-239	0.38	2.9	160	91			530-539						
240-249	0.31	2.4	170	85			540-549						
250-259	0.15	1.2	150	66			550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	13.07	130				

TOTAL CATCH PER EFFORT OF: GILL NET 27 ELECTROFISHING 143 TRAP NET 0

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Brown Bullhead LAKE/RESERVOIR: HAUSER LAKE

DATE: 7-15-92 PERIOD: _____

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149	0.08	1.1					440-449						
150-159							450-459						
160-169	0.23	3.2					460-469						
170-179	0.08	1.1					470-479						
180-189	0.45	6.2	90				480-489						
190-199	0.54	7.4	95				490-499						
200-209	0.08	1.1	110				500-509						
210-219	0.46	6.3	110				510-519						
220-229	0.77	10.6	169				520-529						
230-239	0.61	8.4	175				530-539						
240-249	1.0	13.7	195				540-549						
250-259	0.46	6.3	230				550-559						
260-269	0.23	3.2	220				560-569						
270-279	0.46	6.3	265				570-579						
280-289	0.15	2.1	315				580-589						
290-299	0.54	7.4	330				590-599						
300-309	0.46	6.3	339				600-609						
310-319	0.62	8.5	510				610-619						
320-329							620-629						
330-339	0.08	1.1					TOTAL	7.3	100	3153			

TOTAL CATCH PER EFFORT OF: GILL NET 48 ELECTROFISHING 25 TRAP NET 21

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) TENCH LAKE/RESERVOIR: HAUSER LAKE

DATE: 7-15-92 PERIOD: _____

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	♀ I/M
								340-349	0.31	28					
50-59								350-359	0.85	7.6					
60-69								360-369	1.23	11.0					
70-79								370-379	1.08	9.7					
80-89								380-389	1.69	15.1					
90-99								390-399	0.92	8.2					
100-109								400-409	1.85	16.6					
110-119								410-419	0.69	6.2					
120-129								420-429	1.0	9.0					
130-139								430-439	0.46	4.1					
140-149								440-449	0.15	1.3					
150-159								450-459	0.08	0.7					
160-169								460-469							
170-179								470-479							
180-189								480-489							
190-199	0.08	0.7						490-499							
200-209								500-509							
210-219								510-519							
220-229	0.08	0.7						520-529							
230-239	0.08	0.7						530-539							
240-249	0.08	0.7						540-549							
250-259								550-559							
260-269								560-569							
270-279								570-579							
280-289								580-589							
290-299								590-599							
300-309								600-609							
310-319	0.08	0.7						610-619							
320-329	0.38	3.4						620-629							
330-339	0.08	0.7						TOTAL	11.17	100					

TOTAL CATCH PER EFFORT OF: GILL NET 112 ELECTROFISHING 6 TRAP NET 27

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Brook Trout LAKE/RESERVOIR: HAUSER LAKE

DATE: 7-15-92 PERIOD: _____

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289	0.08	50					580-589						
290-299							590-599						
300-309							600-609						
310-319	0.08	50					610-619						
320-329							620-629						
330-339							TOTAL	0.16	100				

TOTAL CATCH PER EFFORT OF: GILL NET 2 ELECTROFISHING 0 TRAP NET 0

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF:(species) RBT LAKE/RESERVOIR: HAUSER LAKE

DATE: 7-15-92

PERIOD:

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359	0.08	17	560			
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299	0.15	32	300				590-599						
300-309	0.08	17	310				600-609						
310-319	0.08	17	340				610-619						
320-329	0.08	17	345				620-629						
330-339							TOTAL	47	100	1855			

TOTAL CATCH PER EFFORT OF: GILL NET 6 ELECTROFISHING 0 TRAP NET 0

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) AP Clipped RBT LAKE/RESERVOIR: HAUSER LAKE

DATE: 7-15-92 PERIOD: _____

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269	0.08	125	210				560-569						
270-279							570-579						
280-289							580-589						
290-299	0.08	125	280				590-599						
300-309	0.08	125	310				600-609						
310-319	0.15	242	370				610-619						
320-329	0.15	242	380				620-629						
330-339	0.08	125	470				TOTAL	0.62		2030			

TOTAL CATCH PER EFFORT OF: GILL NET 8 ELECTROFISHING 0 TRAP NET 0

Appendix E. Cocolalla Lake - Lake Survey Report.

Cocolalla Lake - Narrative

Cocolalla Lake is located approximately ten miles south of Sandpoint, Idaho. This body of water supports a diverse warmwater and coldwater fish population. With a surface area of 800 acres and a watershed of 52 times its surface area, Cocolalla Lake has a relatively short flushing time of 5.3 months, meaning the lake water is replaced an average of two times per year. The lake bottom is relatively steep-sided, and only the near-shore areas less than ten feet in depth have enough light penetration to support rooted aquatic plants. The mean depth of the lake is 26 feet and maximum depth is approximately 40 feet. During the mid to late summer period, Cocolalla Lake stratifies (thermal layering) where colder, more dense water is near the lake bottom and resists mixing with warmer layers near the surface. During this period of stratification, dissolved oxygen levels drop to near zero in water deeper than 25 feet. Surface temperatures often exceed 70°F down to nearly 20 feet. This limits the usable area for trout to that portion of the lake above the stratification and forces trout into a narrow band called the thermocline.

In 1992, the Idaho Department of Fish and Game conducted a fisheries survey and angler creel survey on Cocolalla Lake to assess the fishery. Our fishery survey entailed the use of gill nets, trap nets, and electrofishing, along with slat traps and trot lines. Nine species of game fish and four species of non-game fish were found during the survey. Game fish sampled included rainbow trout, brook trout, brown trout, cutthroat trout, largemouth bass, black crappie, yellow perch, pumpkinseed sunfish, and channel catfish.

The channel catfish is a newcomer to Cocolalla Lake. Introduced in 1985 by the Department of Fish and Game, the channel catfish is quickly becoming the most sought after fish in Cocolalla Lake. Catfish over 7 1/2 pounds were found during our sampling efforts and anglers report catching catfish in the 15 pound range.

The major fishery on Cocolalla Lake still remains rainbow trout. Our creel census results show that approximately 8,877 hours of fishing effort took place on Cocolalla Lake from April to September of 1992. The majority of this effort was directed at trout. While this may sound like a lot of fishermen, Cocolalla Lake actually receives less fishing pressure than some of the other lakes in the area. Hauser Lake and Spirit Lake fisheries were monitored during the same time period in 1992 that Cocolalla Lake was and both of these lakes saw considerably more angler hours than Cocolalla Lake. In 1992, April through September, Hauser Lake came in number one with the highest fishing pressure, 35,392 hours. Spirit Lake came in second with 31,337 angler hours.

To sustain the amount of fishing pressure on Cocolalla Lake the Department of Fish and Game stocks approximately 8,000 put-and-take size rainbow trout annually. In addition to the rainbow, brown trout fry have been stocked annually in Cocolalla Lake since 1985.

One fishery that is under utilized in Cocolalla Lake appears to be the warmwater fishery. During our creel census we did not see any largemouth bass or black crappie. But our sampling efforts yielded catches of crappie in the 10 1/2 inch range and bass over 17 1/2 inches in length. One problem that a number of anglers have with Cocolalla Lake is the perceived water quality problem that the lake has. Mid to late summer algal blooms have given Cocolalla Lake the reputation of having poor water quality problem. Nutrients from numerous sources in the watershed have resulted in frequent algae blooms but this has not effected the quality of the fish in the lake. Low oxygen levels caused by decomposing algae and warm water temperatures may limit survival of trout but the richness of Cocolalla Lake provides a wealth of primary food sources for fish to grow on.

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

FISH COMMUNITY CHARACTERISTICS

LAKE/RESERVOIR NAME: Cocolalla REGION: 1 DATE: 7-18-10/92

Catch Per Unit* of Combined Gear Sampling Effort $17.23 \text{ units}/3 = 5.74$

SPECIES	LENGTH - RANGE(mm)	No.	%	Wt. (kg)	%
Ad Clip RBT	210 - 360	10.97	5.5	—	
RBT	170 - 310	5.22	2.6		
Brown Trout	310 - 490	1.22	0.6	0.82	
Round Goby	220 - 640	21.07	10.6		
Largemouth Bass	100 - 450	9.93	5.0		
Black Guppy	60 - 270	7.49	3.8		
Yellow Perch	30 - 220	113.18	57.1		
Pumpkin Seed	30 - 180	12.71	6.4		
Brown Bullhead	170 - 290	2.26	1.1		
	-				
	-				
	-				
GAME FISH SUBTOTAL:		184.04	92.8		
Pearmouth	250 - 340	3.31	1.7		
Largemouth Sucker	200 - 560	10.97	5.5		
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
NON-GAME FISH SUBTOTAL:		14.28	0.72		
ALL SPECIES TOTAL:		198.32	100%		100%

* one hour electrofishing, one trap net night, and one combined floating and sinking gill net night.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

C H COMPOSITION OF: (species) Ad Clp RBT LAKE/RESERVOIR: Coccolalla

DATE: 7/8-10/92 PERIOD: 2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369	0.06	2				
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219	0.06	2					510-519						
220-229	0.06	2					520-529						
230-239							530-539						
240-249	0.06	2					540-549						
250-259	0.35	10	170				550-559						
260-269	0.23	6	190				560-569						
270-279	0.23	6	220				570-579						
280-289	0.35	10	250				580-589						
290-299	0.46	13					590-599						
300-309	0.93	25	290				600-609						
310-319	0.64	17	350				610-619						
320-329	0.17	5					620-629						
330-339	0.12	3					TOTAL	3.66	100				

TOTAL CATCH PER EFFORT OF: GILL NET 30 ELECTROFISHING 33 TRAP NET 0

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) RBT LAKE/RESERVOIR: Coccolalla
DATE: 7/8-10/92 PERIOD: 2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	♀ I/M
								340-349	0.06	3	400		3+	M	
50-59								350-359							
60-69								360-369							
70-79								370-379							
80-89								380-389							
90-99								390-399							
100-109								400-409							
110-119								410-419							
120-129								420-429							
130-139								430-439							
140-149								440-449							
150-159								450-459							
160-169								460-469							
170-179	0.06	3	53		1+			470-479							
180-189								480-489							
190-199								490-499							
200-209								500-509							
210-219								510-519							
220-229	0.06	3						520-529							
230-239	0.12	7	140		2			530-539							
240-249								540-549							
250-259	0.12	7						550-559							
260-269	0.23	13						560-569							
270-279	0.23	13						570-579							
280-289	0.29	17						580-589							
290-299	0.12	7						590-599							
300-309	0.23	13						600-609							
310-319	0.23	13	340		2-3+			610-619							
320-329								620-629							
330-339								TOTAL	1.74	100					

TOTAL CATCH PER EFFORT OF: GILL NET 28 ELECTROFISHING 2 TRAP NET 0

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Brown Trout LAKE/RESERVOIR: Cocolalla

DATE: 7/8-10/92 PERIOD: 2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359	0.06	14	400			M
60-69							360-369	0.12	29	510			M
70-79							370-379						
80-89							380-389	0.06	14	610			
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429	0.06	14	1100			M
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499	0.06	14	1700			
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319	0.06	14	400			M	610-619						
320-329							620-629						
330-339							TOTAL	0.41	100	674			

TOTAL CATCH PER EFFORT OF: GILL NET 4 ELECTROFISHING 3 TRAP NET 0

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Channel Catfish LAKE/RESERVOIR: Coccolalla

DATE: 7/8-10/92 PERIOD: 2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349	0.70	10				
50-59							350-359	0.46	7	410	103	7+	
60-69							360-369	0.23	3				
70-79							370-379	0.75	11	370	77	8+	
80-89							380-389	0.41	6				
90-99							390-399	0.46	7				
100-109							400-409	0.41	6	520	84	8+	
110-119							410-419	0.17	2				
120-129							420-429	0.17	2				
130-139							430-439	0.17	2	750	96	7+	
140-149							440-449	0.29	4	810	97	7+	
150-159							450-459	0.12	2	800			
160-169							460-469	0.06	1				
170-179							470-479						
180-189							480-489	0.12	2	1000	90	7-8+	
190-199							490-499						
200-209							500-509	0.29	4	1500			
210-219							510-519	0.06	1	1500		7+	
220-229	0.06	1					520-529						
230-239							530-539	0.06	1	1950		8+	
240-249							540-549						
250-259	0.12	2					550-559	0.17	2	1900		8+	
260-269	0.06	1					560-569	0.12	2	2100			
270-279							570-579	0.06	1	3500			
280-289													
290-299	0.17	2					610-619	0.06	1	3000		8+	
300-309	0.35	5					630-639	0.06	1	2700		8+	
310-319	0.17	2					640-649	0.06	1	3500			
320-329	0.29	4	260	87	7+								
330-339	0.70	10	330	88	6+		TOTAL	7.02	100				

TOTAL CATCH PER EFFORT OF: GILL NET 111 ELECTROFISHING 9 TRAP NET 1

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Black Crappie LAKE/RESERVOIR: Coccolatta

DATE: 7/8-10/92 PERIOD: 2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69	0.06	2					360-369						
70-79	0.06	2					370-379						
80-89	0.06	2					380-389						
90-99	0.06	2					390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139	0.06	2					430-439						
140-149	0.06	2					440-449						
150-159	0.29	12			2+		450-459						
160-169	0.17	7					460-469						
170-179	0.35	14					470-479						
180-189	0.23	9			3+		480-489						
190-199	0.06	2					490-499						
200-209	0.06	2			3+		500-509						
210-219	0.12	5			3+		510-519						
220-229	0.17	7			3+		520-529						
230-239	0.12	5					530-539						
240-249	0.17	7			3+		540-549						
250-259	0.12	5			7+		550-559						
260-269	0.17	7			7+		560-569						
270-279	0.12	5			6+		570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	2.50					

TOTAL CATCH PER EFFORT OF: GILL NET 38 ELECTROFISHING 5 TRAP NET 0

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Yellow Perch LAKE/RESERVOIR: Coccolalla
DATE: 7/8-10/92 PERIOD: 2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
30-39	0.17	1K					340-349						
50-59							350-359						
60-69	0.23	1K					360-369						
70-79	0.52	1					370-379						
80-89	0.99	3					380-389						
90-99	0.35	1					390-399						
100-109	1.74	5					400-409						
110-119	4.00	11			2		410-419						
120-129	3.83	10			2		420-429						
130-139	2.38	6			2		430-439						
140-149	1.80	5			2		440-449						
150	1.68	4			2		450-459						
160-169	1.22	3			4		460-469						
170-179	0.70	2			3		470-479						
180-189	0.35	1			5		480-489						
190-199	0.70	2			6		490-499						
200-209	0.41	1			6		500-509						
210-219	0.29	1			6		510-519						
220-229	0.06	1K			6		520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	37.72	57				

TOTAL CATCH PER EFFORT OF: GILL NET 192 ELECTROFISHING 386 TRAP NET 72

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Pumpkin Seed LAKE/RESERVOIR: Coccolalla

DATE: 7/8-10/92 PERIOD: 2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
30-39	0.06	1					340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89	0.17	4					380-389						
90-99	0.17	4					390-399						
100-109	0.41	10					400-409						
110-119	0.35	8					410-419						
120-129	0.93	22					420-429						
130-139	0.75	18					430-439						
140-149	0.52	12					440-449						
150-159	0.64	15					450-459						
160-169	0.17	4					460-469						
170-179							470-479						
180-189	0.06	1					480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	4.24	100				

TOTAL CATCH PER EFFORT OF: GILL NET 23 ELECTROFISHING 8 TRAP NET 42

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Brown Bullhead LAKE/RESERVOIR: Coccolalla

DATE: 7/8-10/92 PERIOD: 2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179	0.12	15					470-479						
180-189	0.17	23					480-489						
190-199	0.12	15					490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239	0.06	6					530-539						
240-249							540-549						
250-259	0.06	6					550-559						
260-269							560-569						
270-279	0.06	6					570-579						
280-289							580-589						
290-299	0.17	23					590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	0.75					

TOTAL CATCH PER EFFORT OF: GILL NET 9 ELECTROFISHING 0 TRAP NET 4

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Pearmouth LAKE/RESERVOIR: Cocobella

DATE: 7/8-10/92 PERIOD: 2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349	0.06	5				
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259	0.06	5					550-559						
260-269	0.12	11					560-569						
270-279							570-579						
280-289	0.17	16					580-589						
290-299	0.12	11					590-599						
300-309	0.17	16					600-609						
310-319							610-619						
320-329	0.06	5					620-629						
330-339							TOTAL	1.10	-				

TOTAL CATCH PER EFFORT OF: GILL NET 19 ELECTROFISHING 0 TRAP NET 0

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Large scale Sucker LAKE/RESERVOIR: Cocotella

DATE: 7/8-10/92 PERIOD: 2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369	0.06	1				
70-79							370-379						
80-89							380-389	0.06	1				
90-99							390-399						
100-109							400-409	0.17	4				
110-119							410-419						
120-129							420-429						
130-139							430-439	0.06	1				
140-149							440-449	0.17	4				
150-159							450-459	0.06	1				
160-169							460-469	0.12	2				
170-179							470-479	0.06	1				
180-189							480-489	0.12	2				
190-199							490-499	0.06	1				
200-209	0.06	1					500-509	0.06	1				
210-219							510-519	0.12	2				
220-229							520-529	0.06	1				
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569	0.06	1				
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	4.93	35				

TOTAL CATCH PER EFFORT OF: GILL NET 63 ELECTROFISHING 0 TRAP NET 0

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

FISH COMMUNITY CHARACTERISTICS

LAKE/RESERVOIR NAME: Cocolalla Lake REGION: 1 DATE: 3 19.12.92

Catch Per Unit* of Combined Gear Sampling Effort 16.7 units/5 = 3.34

SPECIES	LENGTH - RANGE(mm)	No.	%	Wt. (kg)	%
HRBT	270 - 340	2.70	0.9		
WRBT	210 - 360	1.80	0.6		
CTT	290 - 330	0.90	0.3		
BN	110 - 430	2.99	1.0		
BK	140 - 260	6.89	2.2		
CC	170 - 470	5.39	1.7		
LMB	60 - 460	13.47	4.4		
BC	140 - 300	6.29	2.0		
PE	50 - 270	155.69	50.5		
PS	60 - 170	2.99	1.0		
BBH	100 - 300	5.69	1.8		
GAME FISH SUBTOTAL:		204.79	66.5		
PM	200 - 320	17.07	5.5		
LSS	100 - 515	38.62	12.5		
BLS	405 - 453	47.61	15.5		
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
NON-GAME FISH SUBTOTAL:		103.29	33.5		
ALL SPECIES TOTAL:		308.08	100%		100%

* one hour electrofishing, one trap net night, and one combined floating and sinking gill net night.

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

Hatchery
CATCH COMPOSITION OF: (species) Rainbow Trout LAKE/RESERVOIR: Cocolalla Lake

DATE: 3/9-12/92

PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349	0.06	11				
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279	0.06	11					570-579						
280-289							580-589						
290-299							590-599						
300-309	0.06	11					600-609						
310-319	0.06	11					610-619						
320-329	0.12	22					620-629						
330-339	0.18	33					TOTAL	0.54	100				

TOTAL CATCH PER EFFORT OF: GILL NET 6 ELECTROFISHING 3 TRAP NET -

LOWLAND LAKES AND RESERVOIRS FISH SURVEY

SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Wild Rainbow Trout LAKE/RESERVOIR: Coccolalla

DATE: 3/9-12/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359	0.06	17				
60-69							360-369	0.06	17				
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219	0.06	17					510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279	0.06	17					570-579						
280-289	0.12	33					580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	0.36	100				

TOTAL CATCH PER EFFORT OF: GILL NET 4 ELECTROFISHING 2 TRAP NET -

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Channel Catfish LAKE/RESERVOIR: Coccolalla Lake

DATE: 3/9-12/92

PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349	0.18	17				
50-59							350-359	0.12	11				
60-69							360-369						
70-79							370-379	0.06	6				
80-89							380-389						
90-99							390-399	0.18	17				
100-109							400-409						
110-119							410-419	0.06	6				
120-129							420-429						
130-139							430-439	0.12	11				
140-149							440-449						
150-159							450-459						
160-169							460-469	0.12	11				
170-179	0.06	6					470-479	0.06	6				
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329	0.12	11					620-629						
330-339							TOTAL	1.08	100				

TOTAL CATCH PER EFFORT OF: GILL NET 15 ELECTROFISHING 2 TRAP NET -
Trot Line 1

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Largemouth Bass LAKE/RESERVOIR: Cocolalla

DATE: 3/9-12/92

PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349	0.18	7				
50-59							350-359	0.06	2				
60-69	0.06	2					360-369						
70-79							370-379	0.06	2				
80-89	0.06	2					380-389	0.12	4				
90-99	0.06	2					390-399						
100-109							400-409	0.06	2				
110-119							410-419						
120-129							420-429						
130-139							430-439	0.12	4				
140-149							440-449	0.06	2				
150-159							450-459						
160-169							460-469	0.06	2				
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209	0.06	2					500-509						
210-219							510-519						
220-229	0.06	2					520-529						
230-239							530-539						
240-249							540-549						
250-259	0.06	2					550-559						
260-269	0.24	9					560-569						
270-279	0.12	4					570-579						
280-289	0.06	2					580-589						
290-299	0.18	7					590-599						
300-309	0.12	4					600-609						
310-319	0.30	11					610-619						
320-329	0.12	4					620-629						
330-339	0.18	7					TOTAL	2.69	100				

TOTAL CATCH PER EFFORT OF: GILL NET 12 ELECTROFISHING 33 TRAP NET 1

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Black Crappie LAKE/RESERVOIR: Coccolalla Lake

DATE: 3/9-12/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149	0.06	5					440-449						
150-159							450-459						
160-169							460-469						
170-179	0.06	5					470-479						
180-189							480-489						
190-199	0.06	5					490-499						
200-209							500-509						
210-219	0.18	14					510-519						
220-229	0.24	19					520-529						
230-239							530-539						
240-249	0.18	14					540-549						
250-259	0.24	19					550-559						
260-269	0.18	14					560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309	0.06	5					600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL						

TOTAL CATCH PER EFFORT OF: GILL NET 6 ELECTROFISHING 12 TRAP NET 3

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Yellow Perch LAKE/RESERVOIR: Coccolalla Lake

DATE: 3/9-12/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59	0.96	3					350-359						
60-69	2.51	8					360-369						
70-79	0.42	1					370-379						
80-89	0.24	1					380-389						
90-99	0.78	2					390-399						
100-109	0.66	2					400-409						
110-119	0.78	2					410-419						
120-129	0.66	2					420-429						
130-139	0.18	>1					430-439						
140-149	0.30	1					440-449						
150-159	0.36	1					450-459						
160-169	1.26	4					460-469						
170-179	2.28	7					470-479						
180-189	2.63	8					480-489						
190-199	2.28	7					490-499						
200-209	2.40	7					500-509						
210-219	1.38	4					510-519						
220-229	0.36	1					520-529						
230-239							530-539						
240-249	0.06	>1					540-549						
250-259							550-559						
260-269							560-569						
270-279	0.06	>1					570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	32.04	64				

TOTAL CATCH PER EFFORT OF: GILL NET 111 ELECTROFISHING 334 TRAP NET 90

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Pumpkin Seed LAKE/RESERVOIR: Cocolalla Lake

DATE: 3/9-12/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69	0.12	20					360-369						
70-79	0.06	10					370-379						
80-89							380-389						
90-99	0.06	10					390-399						
100-109							400-409						
110-119	0.06	10					410-419						
120-129							420-429						
130-139							430-439						
140-149	0.12	20					440-449						
150-159							450-459						
160-169	0.12	20					460-469						
170-179	0.06	10					470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	0.60	100				

TOTAL CATCH PER EFFORT OF: GILL NET 3 ELECTROFISHING - TRAP NET 7

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Brown Bullhead LAKE/RESERVOIR: Cocolalla Lake

DATE: 3/9-12/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109	0.06	5					400-409						
110-119	0.06	5					410-419						
120-129	0.06	5					420-429						
130-139							430-439						
140-149	0.06	5					440-449						
150-159	0.06	5					450-459						
160-169	0.06	5					460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239	0.06	5					530-539						
240-249	0.06	5					540-549						
250-259	0.12	11					550-559						
260-269							560-569						
270-279	0.24	21					570-579						
280-289	0.12	11					580-589						
290-299	0.06	5					590-599						
300-309	0.12	11					600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	1.14	100				

TOTAL CATCH PER EFFORT OF: GILL NET 7 ELECTROFISHING 11 TRAP NET -

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Pearmouth Chub LAKE/RESERVOIR: Coccolalla Lake

DATE: 3/9-12/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149	0.06	5					440-449						
150-159							450-459						
160-169							460-469						
170-179	0.06	5					470-479						
180-189							480-489						
190-199	0.06	5					490-499						
200-209							500-509						
210-219	0.18	14					510-519						
220-229	0.24	19					520-529						
230-239							530-539						
240-249	0.18	14					540-549						
250-259	0.24	19					550-559						
260-269	0.18	14					560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309	0.06	5					600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	1.26	100				

TOTAL CATCH PER EFFORT OF: GILL NET 6 ELECTROFISHING 12 TRAP NET 3

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Large Scale Sucker LAKE/RESERVOIR: Coccolalla Lake

DATE: 3/9-12/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	7.72	100				

TOTAL CATCH PER EFFORT OF: GILL NET 69 ELECTROFISHING 60 TRAP NET —

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Bridgehead Sucker LAKE/RESERVOIR: Coccolalla Lake

DATE: 3/9-12/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M		Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	
								340-349							
50-59								350-359							
60-69								360-369							
70-79								370-379							
80-89								380-389							
90-99								390-399							
100-109								400-409							
110-119								410-419							
120-129								420-429							
130-139								430-439							
140-149								440-449							
150-159								450-459							
160-169								460-469							
170-179								470-479							
180-189								480-489							
190-199								490-499							
200-209								500-509							
210-219								510-519							
220-229								520-529							
230-239								530-539							
240-249								540-549							
250-259								550-559							
260-269								560-569							
270-279								570-579							
280-289								580-589							
290-299								590-599							
300-309								600-609							
310-319								610-619							
320-329								620-629							
330-339								TOTAL	9,52	100					

TOTAL CATCH PER EFFORT OF: GILL NET 46 ELECTROFISHING 87 TRAP NET 6

Appendix F. Cocolalla Lake - Creel census report.

Angler Summary Report Idaho Department of Fish and Game

Body of Water: COCOLLALA LAKE

EPA Humber:

Angler Composition

Percent of resident: 85.71%

Percent of non-resident: 14.29%

Percentage of Anglers:

Catching:	Releasing:	Harvesting:
0: 50.38%	0: 0.00%	0: 0.00%
1: 11.28%	1: 8.33%	1: 38.71%
2: 7.52%	2: 16.67%	2: 16.13%
3: 5.26%	3: 11.	3: 3.23%
4: 4.51%	4: 11.	4: 12.90%
5: 3.76%	5: 8.33%	5: 6.457.
more than 6: 17.29%	more than 6: 44.44%	6: 22.58%

Type of Fishing (from Instantaneous Counts)

Boat: 42.05%

Bank: 57.95%

Tube: 0.00%

Ice: 0.00%

Method of Fishing

Bait: 86.86%

Lure: 12.75%

Fly: 0.39%

Catch Composition

AD-RBT:	14.77%	RBT :	34.09%
LMB:	0.00%	CC:	15.91%
PS:	0.00%	PE:	23.867.
BC:	0.00%	OTHER:	11.36%

Number of Completed trips: 63

Average Trip Length: 2.47

Idaho Department of Fish and Game
Creel Survey System
Pressure Report by Interval and Daytype
Summary

Body of Water: COCOLLALA LAKE EPA Humber:
1992

SECTION I	I	I	BOAT I	BARK	I	TUBE I	ICE I
TOTAL							
NUMBER I	INTERVAL I	DAYTYPE I	PE I	ANGLERS I	ANGLERS I	ANGLERS I	ANGLERS I
			HOURS I	HOURS	HOURS I	HOURS	HOURS
1	1	Weekday	8	299	8	8	299
		Interval 1 totals:		8	299	8	8
		+I- at 95N C.I.I		8	8	8	8
							0
1	2	Weekday		476	396	8	8
		Weekend	514	327	8	0	841
		Interval 2 totals:		990	723	8	8
		+/- at 95I C.I.:		777	527	8	8
							939
1	3	Weekday		1253	442	8	0
		Weekend	463	126	8	e	590
		Interval 3 totals:		1716	568	8	8
		+/- at 95X C.I.:		708	370	8	8
							799
1	4	Weekday		178	847	8	0
		Weekend	496	183	8	8	599
		Interval 4 totals:		674	950	8	e
		+1- at 95X C.I.:		357	316	8	0
							477
1	5	Weekday		1172	980	8	8
		Weekend	8	199	8	8	199
		Interval 5 totals:		1172	1179	e	8
		+/- at 95X C.I.:		857	763	8	8
							1147
1	6	Weekend	302	382	8	8	605
		Interval 6 totals:		382	302	8	0
		+/- at 95X C.I.:		116	0	8	8
							116
		Section 1 totals:		4854	4021	0	0
		+/- at 95X C.I.:		1407	1847	0	0
							8877
		Season totals:		4854	4021	8	8
		+/- at 95I C.I.:		1407	1047	0	0
							8877
							1754

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Body of Water
1992

SECTION 1
NUMBER 1

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Interval 3 Totals:
+/- at 95% C.I.:

1 Weekday
Weekend

Interval 4 Totals:
+/- at 95% C.I.:

1 5 Weekday
Weekend

Interval 5 Totals:
+/- at 95% C.I.:

1 6 Weekday
Weekend

Interval 6 Totals:
+/- at 95% C.I.:

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Appendix G. Shepherd Lake - Lake Survey Report.

Shepherd Lake - Narrative

Shepherd Lake (100 acres) is located approximately 1.5 miles southeast of Sagle, Idaho. The lake and surrounding land, with the exception of the southern tip, is owned by the Idaho Department of Fish and Game. The Department maintains two campgrounds on Shepherd Lake. An unimproved camping area is located on the northwest end of the lake and an improved campground with a public boat ramp is located on the northeast shore of Shepherd Lake.

Shepherd Lake is an eutrophic lake that experiences minor water level fluctuation even during drought years. Tributaries to the lake are intermittent and the outlet, Fry Creek, is a tributary to Lake Pend Oreille. The maximum depth of the lake is approximately 40 feet.

On September 24, 1992, surface temperature of the lake was 13.2°C. The lake was strongly stratified with the thermocline (layer of cooler water) located at 25 feet in 38 feet of water. Dissolved oxygen levels were at 5.1 ppm at 23 feet and dropped to 2.7 ppm at 26 feet. Surface pH was 7.03 and the secchi reading was 15 feet.

Shepherd Lake is one of the north Idaho lakes to have received new species introductions in the recent past. In 1989, both bluegill sunfish and tiger muskie were stocked in Shepherd Lake. The bluegill introductions consisted of young-of-the-year and 1-year-old fish. In 1989, 300 bluegill were stocked, and in 1990, another 11,500 bluegill were released into Shepherd Lake.

The tiger muskie introductions occurred at the same time, 350 fish in 1989 and 352 fish in 1990. Another 105 tiger muskie were stocked in 1991. The tiger muskie ranged from four inches to eight inches when stocked.

Seven gallons of gamarus shrimp (approximately 140,000 shrimp) were planted in Shepherd Lake in 1991 in an effort to establish an additional food source in the system.

Shepherd Lake was sampled with gill nets, trap nets, and electrofishing on June 10 and 11, 1992. Only one tiger muskie was sampled, that fish measured 16 inches and weighed 1.57 pounds. No bluegill were sampled and no gamarus shrimp were found. Other species of fish sampled in Shepherd Lake included largemouth bass up to 10.5 inches in length, black crappie measuring nine inches, and yellow perch that measured over ten inches. Pumpkinseed sunfish and brown bullhead were also seen during the survey.

Shepherd Lake is well suited to the warm water fishery it supports and receives considerable fishing pressure. It was noted in a 1954 survey of the lake that it was "probably the most popular bass and panfish lake in Bonner County" and "that numerous bass in the five pound class were are reported taken". In the spring of 1992 a bass weighing between eight and nine pounds was reported to have been caught in Shepherd Lake. While we did not see any bass that would approach that size, it is highly likely that large bass do still persist in Shepherd Lake.

Management recommendations for Shepherd Lake are that we continue with the tiger muskie and bluegill program, even though we did not sample any bluegill there is no reason Shepherd Lake would not support them. It is recommended that the lake be surveyed again after a period of four to five years to further assess the growth and survival of the introduced tiger muskie and bluegill. Also if we have gamarus shrimp available in the future a second stocking of Shepherd Lake is recommended.

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

FISH COMMUNITY CHARACTERISTICS

LAKE/RESERVOIR NAME: Shepherd Lake REGION: 1 DATE: 6/10/11/92

Catch Per Unit* of Combined Gear Sampling Effort $4.6 \text{ units}/3 = 1.53$

SPECIES	LENGTH - RANGE(mm)	No.	%	Wt. (kg)	%
large mouth bass	140 - 320	21.57	11	15.699	12
black crappie	70 - 270	59.48	30	20.571	16
yellow perch	130 - 310	61.44	31	59.742	47
pumpkinseed	100 - 200	54.25	31	29.760	23
Tiger muskie	490 -	0.65	>1	2.130	2
crown bullhead	310 -	1.31	1	-	-
	-				
	-				
	-				
	-				
	-				
	-				
	-				
GAME FISH SUBTOTAL:		198.69	100	127.90	100
None	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
NON-GAME FISH SUBTOTAL:		-	-	-	-
ALL SPECIES TOTAL:		198.69	100%	127.90	100%

* one hour electrofishing, one trap net night, and one combined floating and sinking gill net night.

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Pumpkin Seed LAKE/RESERVOIR: Shepherd

DATE: 6/10-11/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109	0.43	2					400-409						
110-119							410-419						
120-129	0.22	1	40				420-429						
130-139							430-439						
140-149	0.22	1	50				440-449						
150-159	1.74	10	85			I	450-459						
160-169	2.83	16	110			M	460-469						
170-179	3.91	22	110				470-479						
180-189	6.09	34	130				480-489						
190-199	1.30	7	170				490-499						
200-209	1.30	7	180			M	500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	18.04	100	120			

TOTAL CATCH PER EFFORT OF: GILL NET 29 ELECTROFISHING 25 TRAP NET 29

LOWLAND LAKES AND RESERVOIRS FISH SURVEY

SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Yellow Perch LAKE/RESERVOIR: Shepherd

DATE: 6/10-11/92

PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	♀ I/M
								340-349							
50-59								350-359							
60-69								360-369							
70-79								370-379							
80-89								380-389							
90-99								390-399							
100-109								400-409							
110-119								410-419							
120-129								420-429							
130-139	0.22	1	31	100				430-439							
140-149								440-449							
150-159	0.22	1	49	100				450-459							
160-169	0.22	1	60	100				460-469							
170-179	0.65	3	72	100				470-479							
180-189	1.30	6	90	114	3+			480-489							
190-199	2.17	11	103	100				490-499							
200-209	2.83	14	120	100				500-509							
210-219	1.74	9	140	108	4+			510-519							
220-229	0.22	1	151	100				520-529							
230-239	0.65	3	175	100				530-539							
240-249	0.87	4	200	100				540-549							
250-259	1.74	9	229	100				550-559							
260-269	1.74	9	290	112	6-10+			560-569							
270-279	1.96	10	350	119	6+			570-579							
280-289	1.74	9	330	95	11+			580-589							
290-299	1.74	9	320	87	10+			590-599							
300-309	0.43	2	430	104	7+			600-609							
310-319	0.22	1	470	103	7+			610-619							
320-329								620-629							
330-339								TOTAL	20.43	100	212	102			

TOTAL CATCH PER EFFORT OF: GILL NET 61 ELECTROFISHING 33 TRAP NET 0

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Black Croppie LAKE/RESERVOIR: Shepherd

DATE: 6/10-11/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M
								340-349							
50-59								350-359							
60-69								360-369							
70-79	0.22	1	3.6	100				370-379							
80-89								380-389							
90-99								390-399							
100-109								400-409							
110-119								410-419							
120-129	0.43	2	30	136				420-429							
130-139								430-439							
140-149	0.22	1	40	111				440-449							
150-159								450-459							
160-169								460-469							
170-179								470-479							
180-189	1.96	10	90	107				480-489							
190-199	3.70	19	110	109				490-499							
200-209	2.17	11	140	117				500-509							
210-219	2.61	13	200	142				510-519							
220-229	0.65	3	190	115		M		520-529							
230-239	3.26	16	220	115			M	530-539							
240-249	1.09	5	270	122				540-549							
250-259	0.43	2	300	119		M		550-559							
260-269	0.65	3	300	104		M		560-569							
270-279	0.22	1	327	100				570-579							
280-289								580-589							
290-299								590-599							
300-309								600-609							
310-319								610-619							
320-329								620-629							
330-339								TOTAL	19.78	100	75.35	115			

TOTAL CATCH PER EFFORT OF: GILL NET 72 ELECTROFISHING 19 TRAP NET 0

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) largemouth bass LAKE/RESERVOIR: Shepherd

DATE: 6/10-11/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	♀ I/M
								340-349							
50-59								350-359							
60-69								360-369							
70-79								370-379							
80-89								380-389							
90-99								390-399							
100-109								400-409							
110-119								410-419							
120-129								420-429							
130-139								430-439							
140-149	0.22	3	30	88				440-449							
150-159								450-459							
160-169	0.22	3	47	90				460-469							
170-179								470-479							
180-189								480-489							
190-199	0.43	6	90	100				490-499							
200-209	1.74	24	105	98				500-509							
210-219	0.43	6	113	98				510-519							
220-229	0.65	9	140	97				520-529							
230-239	0.43	6	150	90				530-539							
240-249	0.87	12	170	89				540-549							
250-259	0.22	3	210	97				550-559							
260-269	0.65	9	200	81				560-569							
270-279	0.43	6	260	94				570-579							
280-289	0.22	3	290	93				580-589							
290-299	0.43	6	290	83				590-599							
300-309								600-609							
310-319								610-619							
320-329	0.22	3	400	84				620-629							
330-339								TOTAL	7.17	100	159	85			

TOTAL CATCH PER EFFORT OF: GILL NET 14 ELECTROFISHING 19 TRAP NET 0

Appendix H. Dawson Lake - Lake Survey Report. Dawson

Lake - Narrative

Dawson Lake and the surrounding upland were purchased by the Idaho Department of Fish and Game in 1970. At approximately 35 acres in size, Dawson Lake is one of the smaller lakes in north Idaho and is one of the most popular spiny-rayed fisheries in Bonner County. The littoral zone, or shallow area where rooted aquatic vegetation occurs, in Dawson Lake is quite extensive. Weed beds are abundant, occurring in distinct pockets. Other habitat for fish is created by the substantial amount of downed timber ringing the entire lake. The maximum depth in Dawson Lake is approximately 18 feet with mean depth of 13 feet. In late summer Dawson Lake sets up a mild thermocline, or stratification, of the water layers due to temperature differences, with surface water temperatures of 70°F and temperatures of 55°F on the bottom. During the summer when the lake is stratified with warm water on top and cold water below there is an oxygen sag or lack of oxygen that occurs at approximately the 10 foot depth. This restricts most fish to that area of the lake above 10 feet. Dawson Lake has not been known to severely winter kill.

In 1989, the Fish and Game Department introduced channel catfish (2,000), tiger muskie (75), and bluegill sunfish (130) to Dawson Lake. These initial introductions were followed up with additional stockings of catfish in 1990 and 1991 (2,000 each year) and bluegill (9,000) and tiger muskie (110) in 1990 only. In 1990, gammarus shrimp were also introduced to Dawson Lake in an effort to provide an additional food source for the fish.

Dawson lake was last surveyed in 1990, prior to the stocking of channel catfish, tiger muskie, and bluegill that year. During that survey, no fish from the 1989 introductions were found. In 1992, Dawson Lake was again surveyed. Utilizing gill nets, trap nets, and an electrofishing boat we were able to collect all three of the introduced fish species. No gammarus shrimp were found during the survey, however. It is possible that our gammarus shrimp stockings only afforded the fish in Dawson Lake with a quick meal. It is also possible that the shrimp still do exist in limited number and may take a few more years to become firmly established.

Only one channel catfish was taken during the sampling period. This fish measured 14.5 inches and weighed just over 1 pound. Age analysis showed the catfish to be four years old which would make it one of the fish from the first stocking in 1989. When compared to the growth rate of channel catfish in other north Idaho waters, the Dawson Lake fish is doing better than average. For example, channel catfish of the same size in Cocolalla Lake range from 6 to 8 years of age.

The two tiger muskie sampled, 18 inches and 22 inches in length and weighing 1.3 pounds and 2 pounds, respectively, were from the 1990 stocking year. The growth rate of these fish indicates it requires from three to four years for tiger muskie to reach the 30 inch minimum size required for harvest.

The bluegill are the real success story in Dawson Lake. Our introduction appears to have established a reproducing population of bluegill. Fish ranging from four to ten inches were sampled in Dawson Lake. Age analysis from scale samples taken from the bluegill showed 4-year-old fish from the 1989 stocking, 3-year-old fish from the 1990 stocking, and

2-year-old fish that would have been from the 1991 brood year. We did not stock any bluegill in 1991, so the 2-year-old fish are from natural reproduction in Dawson lake.

In addition to the three new fish species introduced to Dawson Lake, there still remains a good population of largemouth bass and black crappie, along with yellow perch, pumpkinseed, and brown bullhead. Dawson Lake has long been known for good catches of black crappie up to ten inches in length and a few largemouth bass in excess of four pounds. Our sampling reveled that the introduction of the new species has not hurt these other fisheries. Average length of the black crappie sampled was around eight inches with a fair number reaching ten inches. Largemouth bass in the sample approached 18 inches with good numbers of bass in the 14 to 16 inch range. The yellow perch in Dawson Lake average about seven inches but there are individuals up to nine inches.

Management recommendations for Dawson Lake are to maintain our present course of action. When available, we will stock channel catfish and tiger muskie in Dawson Lake. The bluegill population is reproducing and should be at a self sustaining level. The success of the gamarus introduction is still in question. It may be that we provided a short-term food source for the fish in Dawson Lake. It is also possible that our survey missed the shrimp and they are there in limited numbers and may take a few years to firmly establish themselves. If additional gamarus shrimp are available in the future, Dawson Lake should be stocked again.

FISH COMMUNITY CHARACTERISTICS

Catch Per Unit* of Combined Gear Sampling Effort $4.65 \text{ units}/3 = 1.5$.

* one hour electrofishing, one trap net night, and one combined floating and sinking gill net night.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Bluegill LAKE/RESERVOIR: Dawson

DATE: 6/9-10/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109	0.22	6	30	167			400-409						
110-119							410-419						
120-129	0.43	12	60	182			420-429						
130-139							430-439						
140-149	0.65	18	80	145			440-449						
150-159	0.65	18	90	130			450-459						
160-169	0.65	18	130	151			460-469						
170-179	0.43	12	150	143			470-479						
180-189	0.22	6	170	134			480-489						
190-199	0.22	6	200	132			490-499						
200-209	0.22	6	230	128			500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	3.66	100	115	146		

TOTAL CATCH PER EFFORT OF: GILL NET 0 ELECTROFISHING 15 TRAP NET 2

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Black Crappie LAKE/RESERVOIR: Dawson

DATE: 6/9 - 10/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119	0.65	4	20	125			410-419						
120-129	0.86	6	30	136			420-429						
130-139	0.22	1	40	143			430-439						
140-149							440-449						
150-159	0.65	4	50	109			450-459						
160-169	0.22	1	80	140			460-469						
170-179	1.29	9	80	114			470-479						
180-189	3.87	27	100	119			480-489						
190-199	1.08	7	120	119			490-499						
200-209	0.22	1	130	700			500-509						
210-219	0.65	4	150	106			510-519						
220-229	1.29	9	180	109			520-529						
230-239	1.72	12	210	110			530-539						
240-249	0.86	6	250	113			540-549						
250-259	0.86	6	270	107			550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	14.41	100	131	TR		

TOTAL CATCH PER EFFORT OF: GILL NET 19 ELECTROFISHING 47 TRAP NET 1

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Yellow Perch LAKE/RESERVOIR: Dawson

DATE: 6/9 - 10/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wt	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wt	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119	0.22	4					410-419						
120-129							420-429						
130-139							430-439						
140-149	0.43	8					440-449						
150-159	0.43	8					450-459						
160-169	0.86	17					460-469						
170-179	0.65	13					470-479						
180-189	1.08	21					480-489						
190-199	0.43	8	80	85	4+		490-499						
200-209	0.65	13	100	90	6+		500-509						
210-219							510-519						
220-229	0.43	8					520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL						

TOTAL CATCH PER EFFORT OF: GILL NET 2 ELECTROFISHING 22 TRAP NET 0

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Largemouth Bass LAKE/RESERVOIR: Dawson

DATE: 6/9-10/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369	0.22	2	850	122		
70-79							370-379						
80-89							380-389	0.22	2	950	115		
90-99	0.22	2	8.3	~100			390-399	0.43	5	950	106		
100-109							400-409	0.22	2	800	82		
110-119							410-419	0.86	9	1100	105		
120-129							420-429	0.22	2	1300	121		
130-139							430-439						
140-149							440-449						
150-159	0.65	7	50	119			450-459	0.22	2	1450	103		
160-169	0.22	2	60	115			460-469	0.22	2	1500	99		
170-179	0.43	5	70	111			470-479						
180-189	0.22	2	100	132			480-489						
190-199	0.43	5	100	111			490-499						
200-209							500-509						
210-219							510-519						
220-229	1.29	14	150	104			520-529						
230-239	1.29	14	160	96			530-539						
240-249	0.65	7	180	95			540-549						
250-259	0.43	5	200	92			550-559						
260-269	0.22	2	220	89			560-569						
270-279							570-579						
280-289							580-589						
290-299	0.43	5	350	101			590-599						
300-309							600-609						
310-319	0.22	2	400	93			610-619						
320-329							620-629						
330-339							TOTAL	9.25	100	417	105		

TOTAL CATCH PER EFFORT OF: GILL NET 17 ELECTROFISHING 26 TRAP NET 0

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Channel Catfish LAKE/RESERVOIR: Danson

DATE: 6/9-10/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379	0.22	100	520	109		
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	0.22	100	520	109		

TOTAL CATCH PER EFFORT OF: GILL NET 0 ELECTROFISHING 0 TRAP NET 1

Appendix I. Spirit Lake - Lake Survey Report.

Spirit Lake - Narrative

Spirit Lake is located in the northwestern corner of Kootenai County, Idaho, near the town of Spirit Lake. This oligotrophic lake has a surface area of 1,446 acres. Brickel Creek is the major tributary to Spirit Lake, originating on the eastern side of M Spokane. Spirit Lake discharges into Spirit Creek, an intermittent stream located at the northern end of the lake, and flows north then west into the Rathdrum Prairie Aquifer. Current ownership of the land surrounding Spirit Lake is divided among corporations, private individuals, and the State of Idaho. The Spirit Lake shoreline, especially the northern and eastern shores, is privately owned and highly developed with seasonal year-around residences.

Spirit Lake supports a two-story fishery with both salmonids and spiny-ray fishes. The predominant fishery on the lake is the kokanee salmon fishery, producing more kokanee per surface area than any other lake in north Idaho. Prior to this evaluation, the fisheries management of Spirit Lake consisted of stocking approximately 10,000 put-and-take size rainbow trout in the lake beginning in March each year and continuing through June. In addition to the larger put-and-take size fish, we also stocked approximately 45,000 put-grow-and-take rainbow trout each fall. In 1992, the Idaho Department of Fish and Game conducted a fishery survey and a creel census on the lake to assess the hatchery rainbow trout program.

Utilizing gill nets, trap nets, and an electrofishing boat, we surveyed Spirit Lake once in late March and early April and then again in July of 1992. Our sampling efforts resulted in catches of rainbow trout, cutthroat trout, rainbow/cutthroat hybrids, kokanee salmon, pygmy whitefish, largemouth bass, black crappie, pumpkinseed sunfish, yellow perch, and brown bullhead.

Rainbow trout in the sample ranged from four inches to 26 inches. The larger fish, in the 20 inch to 26 inch range are from a 1987 stocking of 20,160 domestic Kamloops rainbow fingerlings. These fish have converted to a piscivorous diet and are utilizing the kokanee salmon resource in Spirit Lake similar to the Gerrard Kamloops in Lake Pend Oreille. This is essentially an unexploited fishery as very few people even know they exist in Spirit Lake and even fewer anglers fish for them.

Cutthroat trout in our sample averaged 11 inches, with the largest at 15 inches. There is likely some natural reproduction of cutthroat and rainbow occurring in Brickel Creek but what extent is unknown.

Kokanee salmon in Spirit Lake provide, by far, the greatest harvest of any of the fishes. A reoccurring comment from the kokanee anglers on Spirit Lake is that the kokanee are smaller than kokanee from other area lakes. It is a frequent request that we increase the daily possession limit of kokanee on Spirit Lake to "thin out the population so they can grow larger." The small size of kokanee in Spirit Lake is a misconception. Data obtained from annual trawling of north Idaho lakes shows the kokanee from Spirit Lake to be as large, if not larger, than same age kokanee from Lake Pend Oreille or Coeur d'Alene Lake. The average size of age 2 kokanee sampled in Spirit in the middle of July 1992 was 7.5 inches and the average size of age 3 and older kokanee was 8.5 inches. One possible reason for the misconception is the abundance of younger, immature age 2 fish that occur in the angler

catch. The proportion of age 2 kokanee in the Spirit Lake angler catch is considerably greater than is seen in catches from Lake Pend Oreille or Coeur d'Alene Lake.

While not one of the more sought after species in the lake, there are some relatively good size largemouth bass in Spirit Lake. The size of largemouth bass in our survey sample ranged up to 15.75 inches and weighed 2.2 pounds. Black crappie are of an average size for what is seen in most north Idaho lakes, with most of the fish in the 6 inch to 7 inch range, and a few up to 12 inches in Spirit Lake.

The angler creel census conducted on Spirit Lake in 1992 ran from April 1 through September 30. During this period of time, an estimated 31,337 hours of angling effort was expended on Spirit Lake. Resident anglers accounted for 79.87% and non-residents 20.13% of this time. Nearly 80% of the angling effort took place from a boat and 20.31 % was from shore. The most sought after species of fish was kokanee, with 69.5% of the effort. Anglers fishing for whatever they could catch (no definite target species) came in second at 14.5%, and trout anglers came in third with 8.4%. Bass anglers accounted for 7.6% of the fishermen. During the six-month period when the creel census was conducted, anglers harvested approximately 102,595 kokanee, 1,435 rainbow trout (448 of these were from the 1992 release of put-and-take size fish), 1,104 cutthroat trout, 546 black crappie, 360 yellow perch, and 21 largemouth bass.

From the creel census information, it is apparent the most important fishery on Spirit Lake is for kokanee based on what anglers prefer and what they harvest. The fingerling stockings of domestic Kamloops rainbow trout are providing an unexpected trophy size trout in Spirit Lake. While very few anglers are currently fishing for or even aware of these fish, they do contribute to the fishery. At the same time the inherent danger of stocking 45,000 potential kokanee predators in Spirit Lake each year needs to be taken in to account. The number of fingerlings stocked should be reduced to 5,000 per year and reevaluated. The put-and-take rainbow stockings of 10,000 fish per year contribute a limited number of harvested fish that are primarily caught at the public boat ramp and mill pond area at the northeast end of Spirit Lake. This segment of the fishery can probably be maintained with a reduction in the number of fish stocked to 1,000 per month, March through June.

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

FISH COMMUNITY CHARACTERISTICS

3/30-4/1/92

LAKE/RESERVOIR NAME: Spirit Lake REGION: 1 DATE: 1/1/1

Catch Per Unit* of Combined Gear Sampling Effort (13.5 units/3 = 4.5)

SPECIES	LENGTH - RANGE(mm)	No.	%	Wt. (kg)	%
RBT	110 - 420	17.78	5.7		
CTT	110 - 380	4.67	1.5		
BK	150 - 300	1.56	0.5		
KOK	180 - 240	8.22	2.6		
LMB	50 - 450	4.89	1.6		
BC	80 - 260	4.89	1.6		
PE	80 - 220	179.78	57.1		
PS	50 - 180	30.00	9.5		
Home WF	210 - 340	2.22	7.1		
BBH	170 - 330	60.67	19.3		
	-				
GAME FISH SUBTOTAL:		314.67	100		
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
NON-GAME FISH SUBTOTAL:		-	-		
ALL SPECIES TOTAL:		314.67	100%		100%

* one hour electrofishing, one trap net night, and one combined floating and sinking gill net night.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Kokanee Salmon LAKE/RESERVOIR: Spirit Lake

DATE: 3/30-4/1/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189	0.22	8					480-489						
190-199							490-499						
200-209	0.89	32					500-509						
210-219	1.04	38					510-519						
220-229	0.52	19					520-529						
230-239							530-539						
240-249	0.07	3					540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	2.74	100				

TOTAL CATCH PER EFFORT OF: GILL NET 21 ELECTROFISHING 16 TRAP NET —

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF:(species) Brook Trout LAKE/RESERVOIR: Spirit Lake

DATE: 3/30-4/1/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159	0.15	29					450-459						
160-169							460-469						
170-179	0.07	14					470-479						
180-189	0.07	14					480-489						
190-199							490-499						
200-209	0.15	29					500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309	0.07	14					600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	0.52	100				

TOTAL CATCH PER EFFORT OF: GILL NET 7 ELECTROFISHING - TRAP NET -

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Rainbow Trout LAKE/RESERVOIR: Spirit Lake

DATE: 3/30 - 4/1/92

PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369	0.07	1				
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119	0.74	13					410-419						
120-129	0.52	9					420-429	0.07	1				
130-139	1.11	19					430-439						
140-149	1.11	19					440-449						
150-159	0.22	4					450-459						
160-169	0.30	5					460-469						
170-179	0.07	1					470-479						
180-189	0.07	1					480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239	0.15	3					530-539						
240-249							540-549						
250-259	0.15	3					550-559						
260-269	0.07	1					560-569						
270-279	0.30	5					570-579						
280-289	0.15	3					580-589						
290-299	0.30	5					590-599						
300-309	0.22	4					600-609						
310-319	0.22	4					610-619						
320-329	0.07	1					620-629						
330-339	0.07	1					TOTAL	5.93	100				

TOTAL CATCH PER EFFORT OF: GILL NET 16 ELECTROFISHING 50 TRAP NET 14

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Cutthroat Trout LAKE/RESERVOIR: Spirit Lake

DATE: 3/30 - 4/1/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389	0.07	5				
90-99							390-399						
100-109							400-409						
110-119	0.15	10					410-419						
120-129							420-429						
130-139	0.07	5					430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199	0.07	5					490-499						
200-209							500-509						
210-219							510-519						
220-229	0.15	10					520-529						
230-239							530-539						
240-249	0.22	14					540-549						
250-259							550-559						
260-269	0.22	14					560-569						
270-279	0.07	5					570-579						
280-289	0.07	5					580-589						
290-299	0.30	19					590-599						
300-309	0.07	5					600-609						
310-319	0.07	5					610-619						
320-329							620-629						
330-339							TOTAL	1.56	100				

TOTAL CATCH PER EFFORT OF: GILL NET 11 ELECTROFISHING 7 TRAP NET 3

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Largemouth Bass LAKE/RESERVOIR: Spirit Lake

DATE: 3/30-4/1/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59	0.07	5					350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389	0.15	9				
90-99							390-399						
100-109							400-409	0.07	5				
110-119	0.22	14					410-419						
120-129	0.07	5					420-429						
130-139							430-439						
140-149	0.07	5					440-449	0.15	9				
150-159	0.07	5					450-459	0.07	5				
160-169							460-469						
170-179	0.07	5					470-479						
180-189							480-489						
190-199							490-499						
200-209	0.07	5					500-509						
210-219							510-519						
220-229							520-529						
230-239	0.07	5					530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289	0.07	5					580-589						
290-299	0.15	9					590-599						
300-309							600-609						
310-319	0.07	5					610-619						
320-329	0.07	5					620-629						
330-339	0.07	5					TOTAL	1.63	100				

TOTAL CATCH PER EFFORT OF: GILL NET 1 ELECTROFISHING 6 TRAP NET 15

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Black Crappie LAKE/RESERVOIR: Spirit Lake

DATE: 3/30-4/1/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89	0.07	5					380-389						
90-99	0.30	18					390-399						
100-109	0.15	9					400-409						
110-119	0.07	5					410-419						
120-129	0.22	14					420-429						
130-139	0.15	9					430-439						
140-149	0.15	9					440-449						
150-159	0.15	9					450-459						
160-169							460-469						
170-179	0.07	5					470-479						
180-189							480-489						
190-199							490-499						
200-209	0.07	5					500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249	0.15	9					540-549						
250-259							550-559						
260-269	0.07	5					560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL						

TOTAL CATCH PER EFFORT OF: GILL NET 2 ELECTROFISHING 11 TRAP NET 9

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Yellow Perch LAKE/RESERVOIR: Spirit Lake

DATE: 3/30 - 4/1/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89	0.07	>1					380-389						
90-99							390-399						
100-109	0.07	>1					400-409						
110-119	0.59	1					410-419						
120-129	1.04	2					420-429						
130-139	2.07	3					430-439						
140-149	1.93	3					440-449						
150-159	1.33	2					450-459						
160-169	2.07	3					460-469						
170-179	1.93	3					470-479						
180-189	1.85	3					480-489						
190-199	1.56	3					490-499						
200-209	0.59	1					500-509						
210-219	0.15	>1					510-519						
220-229	0.07	>1					520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	15.70	26				

TOTAL CATCH PER EFFORT OF: GILL NET 224 ELECTROFISHING 414 TRAP NET 171

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Pumpkin Seed LAKE/RESERVOIR: Spirit Lake

DATE: 3/30 - 4/1/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59	0.07	>1					350-359						
60-69	0.67	7					360-369						
70-79	0.07	>1					370-379						
80-89	0.44	4					380-389						
90-99	0.15	1					390-399						
100-109	0.22	2					400-409						
110-119	0.59	6					410-419						
120-129	0.74	7					420-429						
130-139	1.19	12					430-439						
140-149	0.52	5					440-449						
150-159	0.96	10					450-459						
160-169	0.22	2					460-469						
170-179	0.22	2					470-479						
180-189	0.07	>1					480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	6.15	61				

TOTAL CATCH PER EFFORT OF: GILL NET 19 ELECTROFISHING 80 TRAP NET 36

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Pigmy Whitefish LAKE/RESERVOIR: Spirit Lake

DATE: 3/30-4/1/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349	0.15	20				
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219	0.15	20					510-519						
220-229							520-529						
230-239	0.07	10					530-539						
240-249							540-549						
250-259	0.15	20					550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309	0.15	20					600-609						
310-319							610-619						
320-329	0.07	10					620-629						
330-339	0.07	10					TOTAL	0.74	100				

TOTAL CATCH PER EFFORT OF: GILL NET 10 ELECTROFISHING - TRAP NET -

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Brown Bullhead LAKE/RESERVOIR: Spirit Lake

DATE: 3/30-4/1/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179	0.07	>1					470-479						
180-189	0.22	1					480-489						
190-199	0.07	>1					490-499						
200-209							500-509						
210-219	0.22	1					510-519						
220-229	0.07	>1					520-529						
230-239	0.22	1					530-539						
240-249	0.44	2					540-549						
250-259	0.07	>1					550-559						
260-269	0.22	1					560-569						
270-279	0.15	>1					570-579						
280-289	0.07	>1					580-589						
290-299							590-599						
300-309	0.07	>1					600-609						
310-319							610-619						
320-329	0.15	>1					620-629						
330-339	0.07	>1					TOTAL	2.15	11				

TOTAL CATCH PER EFFORT OF: GILL NET 52 ELECTROFISHING 35 TRAP NET 186

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

FISH COMMUNITY CHARACTERISTICS

LAKE/RESERVOIR NAME: Spirit Lake REGION: 1 DATE: 7/29/92 ¹⁵⁻¹⁷

Catch Per Unit* of Combined Gear Sampling Effort 9.7 units/3 = 3.23

SPECIES	LENGTH - RANGE(mm)	No.	%	Wt. (kg)	%
Ad Cl/p RBT	250 - 260	0.62	0.8		
RBT	170 - 660	4.64	5.9		
CT	270 - 290	0.62	0.8		
RBT/CT	410 -	0.31	0.4		
Kok	190 - 220	1.86	2.4		
LMB	30 - 400	7.11	9.1	1.334	
BC	90 - 300	7.42	9.4		
PE	110 - 240	7.11	9.1		
PS	40 - 180	28.14	35.8		
Pomuy WF	160 - 190	5.88	7.5		
BBH	90 - 300	14.85	18.9		
GAME FISH SUBTOTAL:		78.56	100		
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
NON-GAME FISH SUBTOTAL:		0	0		
ALL SPECIES TOTAL:		78.56	100%		100%

* one hour electrofishing, one trap net night, and one combined floating and sinking gill net night.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY

SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Ad Clip Rainbow Trout LAKE/RESERVOIR: Spirit Lake

DATE: 7/15-17 & 29/92 PERIOD: 2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259	0.10	50					550-559						
260-269	0.10	50					560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	0.21	100				

TOTAL CATCH PER EFFORT OF: GILL NET 2 ELECTROFISHING _____ TRAP NET _____

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Rainbow Trout LAKE/RESERVOIR: Spirit Lake

DATE: 7/15-17 & 29/92 PERIOD: 2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419	0.10	7				
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179	0.10	7			2+		470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519	0.10	7			6+	
220-229	0.10	7					520-529						
230-239							530-539						
240-249	0.21	13					540-549						
250-259	0.31	20					550-559						
260-269	0.10	7			2+		560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309	0.10	7											
310-319	0.10	7			4+		630-639	0.10	7			6+	
320-329	0.10	7					660-669	0.10	7			6+	
330-339							TOTAL	1.55	-				

TOTAL CATCH PER EFFORT OF: GILL NET 15 ELECTROFISHING _____ TRAP NET _____

LOWLAND LAKES AND RESERVOIRS FISH SURVEY

SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Cutthroat Trout LAKE/RESERVOIR: Spirit Lake

DATE: 7/15-17 & 29/92

PERIOD: 2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279	0.10	50			5+		570-579						
280-289							580-589						
290-299	0.10	50					590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	0.21	50				

TOTAL CATCH PER EFFORT OF: GILL NET 2 ELECTROFISHING _____ TRAP NET _____

LOWLAND LAKES AND RESERVOIRS FISH SURVEY

SPECIES SUMMARY SHEET

Rainbow/Cutthroat

CATCH COMPOSITION OF: (species)

Trout Hybrids

LAKE/RESERVOIR:

Spirit Lake

DATE:

7/5-17/92

PERIOD:

2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419	<i>0.10</i>	<i>100</i>			<i>7+</i>	
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	<i>0.10</i>	<i>100</i>				

TOTAL CATCH PER EFFORT OF: GILL NET *1* ELECTROFISHING _____ TRAP NET _____

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Kokanee Salmon LAKE/RESERVOIR: Spirit Lake

DATE: 7/15-17/92

PERIOD: 2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199	0.10	17			2+		490-499						
200-209							500-509						
210-219	0.21	33			3+		510-519						
220-229	0.31	50			3+		520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	0.62	100				

TOTAL CATCH PER EFFORT OF: GILL NET 6 ELECTROFISHING _____ TRAP NET _____

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Largemouth Bass LAKE/RESERVOIR: Spirit Lake

DATE: 7/15-17/92

PERIOD: 2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
30-39	0.10	4					340-349						
50-59							350-359						
60-69							360-369						
70-79	0.10	4	4				370-379	0.10	4	950	125		
80-89	0.21	9	6				380-389						
90-99							390-399						
100-109							400-409	0.10	4	1000	103		
110-119							410-419						
120-129	0.41	17	20	95			420-429						
130-139	0.21	9	27				430-439						
140-149							440-449						
150-159	0.10	4	40	95			450-459						
160-169							460-469						
170-179							470-479						
180-189	0.10	4	93	122			480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229	0.10	4	130	90			520-529						
230-239	0.21	9	180	108			530-539						
240-249	0.10	4	250	132			540-549						
250-259	0.31	13	240	111			550-559						
260-269							560-569						
270-279							570-579						
280-289	0.21	9	315	101			580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	2.37	100				

TOTAL CATCH PER EFFORT OF: GILL NET 10 ELECTROFISHING 13 TRAP NET 0

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Black Crappie LAKE/RESERVOIR: Spirit Lake

DATE: 7/15-17 & 29/92

PERIOD: 2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M
								340-349							
50-59								350-359							
60-69								360-369							
70-79								370-379							
80-89								380-389							
90-99	0.10	4	8					390-399							
100-109	0.10	4	12					400-409							
110-119	0.82	33	22	138				410-419							
120-129	0.21	8	25	114				420-429							
130-139	0.10	4	29	104				430-439							
140-149	0.10	4	35	97				440-449							
150-159	0.21	8	40	87				450-459							
160-169	0.21	8	60	105				460-469							
170-179	0.21	8	50	71				470-479							
180-189	0.10	4	85	101				480-489							
190-199	0.10	4	100	99				490-499							
200-209								500-509							
210-219								510-519							
220-229								520-529							
230-239								530-539							
240-249								540-549							
250-259								550-559							
260-269								560-569							
270-279	0.10	4	340	104				570-579							
280-289								580-589							
290-299								590-599							
300-309	0.10	4	480	103				600-609							
310-319								610-619							
320-329								620-629							
330-339								TOTAL							

TOTAL CATCH PER EFFORT OF: GILL NET 15 ELECTROFISHING 8 TRAP NET

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Yellow Perch LAKE/RESERVOIR: Spirit Lake

DATE: 7/15-17 & 29/92 PERIOD: 2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	♀ I/M
								340-349							
50-59								350-359							
60-69								360-369							
70-79								370-379							
80-89								380-389							
90-99								390-399							
100-109								400-409							
110-119	0.10	4						410-419							
120-129	0.10	4						420-429							
130-139	0.10	4						430-439							
140-149	0.41	17	20	57	2+			440-449							
150-159	0.21	9	30	68	2+			450-459							
160-169	0.82	35	30	56	2+			460-469							
170-179								470-479							
180-189	0.10	4	50	63	3+			480-489							
190-199								490-499							
200-209	0.10	4	90	81	3+, 4+			500-509							
210-219	0.21	9						510-519							
220-229								520-529							
230-239	0.10	4	145	83	6+, 7+			530-539							
240-249	0.10	4						540-549							
250-259								550-559							
260-269								560-569							
270-279								570-579							
280-289								580-589							
290-299								590-599							
300-309								600-609							
310-319								610-619							
320-329								620-629							
330-339								TOTAL	2.37	100					

TOTAL CATCH PER EFFORT OF: GILL NET 11 ELECTROFISHING 12 TRAP NET 0

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Pumpkin Seed LAKE/RESERVOIR: Spirit Lake

DATE: 7/15-17/92 PERIOD: 2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
40-49	0.10	1					340-349						
50-59							350-359						
60-69	0.62	7	5				360-369						
70-79	1.13	12					370-379						
80-89	0.82	9	10				380-389						
90-99	0.41	4	20				390-399						
100-109	0.72	8	24				400-409						
110-119	0.72	8	25				410-419						
120-129	0.93	10	20				420-429						
130-139	1.03	11	40				430-439						
140-149	1.24	13	45				440-449						
150-159	0.62	7	60				450-459						
160-169	0.93	10	75				460-469						
170-179							470-479						
180-189	0.10	1	120				480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	9.38	100				

TOTAL CATCH PER EFFORT OF: GILL NET 26 ELECTROFISHING 51 TRAP NET 14

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Pigmy Whitefish LAKE/RESERVOIR: Spirit Lake

DATE: 7/15-17 & 29/92

PERIOD: 2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169	0.41	21					460-469						
170-179	1.03	53					470-479						
180-189	0.41	21					480-489						
190-199	0.10	5					490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	1.96	100				

TOTAL CATCH PER EFFORT OF: GILL NET 19 ELECTROFISHING _____ TRAP NET _____

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Brown Bullhead LAKE/RESERVOIR: Spirit Lake

DATE: 7/15-17 & 29/92

PERIOD: 2

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99	0.10	2					390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149	0.31	6					440-449						
150-159	0.10	2					450-459						
160-169							460-469						
170-179	0.52	10					470-479						
180-189							480-489						
190-199	0.62	13					490-499						
200-209	0.52	10					500-509						
210-219	0.52	10					510-519						
220-229	0.31	6					520-529						
230-239	0.10	2					530-539						
240-249	0.52	10					540-549						
250-259	0.41	8					550-559						
260-269	0.41	8					560-569						
270-279							570-579						
280-289	0.10	2					580-589						
290-299	0.21	4					590-599						
300-309	0.21	4					600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	4.95	100				

TOTAL CATCH PER EFFORT OF: GILL NET 15 ELECTROFISHING 2 TRAP NET 31

Appendix J. Spirit Lake - Creel census report.

Angler Summary Report
Idaho Department of Fish and Game

Body of Water: SPIRIT LAKE

EPA Humber:

Angler Composition
Percent of resident: 79.87%
Percent of non-resident: 20.13%

Catching:		Releasing:		Harvesting:	
0:	16.23%	0:	0.00%	0:	0.00%
1:	4.87%	1:	5.06%	1:	4.98%
2:	4.87%	2:	10.13%	2:	3.17%
3:	3.57%	3:	5.06%	3:	4.52%
4:	1.95%	4:	7.59%	4:	0.90%
5:	2.92%	5:	5.06%	5:	3.17%
more than 6:	65.58%	more than 6:	67.09%	6:	83.26%

Type of Fishing (from Instantaneous Counts)

Boat: 79.69%
Bank: 20.31%
Tube: 0.00%
Ice: 0.00%

Method of Fishing

Bait: 85.10%
Lure: 14.80%
Fly: 0.11%

Catch Composition

AD-RBT :	0.37%	RBT :	0.87%
CUT:	1.46'%. .	KOK:	95.57%
LMB:	0.03%	PE:	0.30%
BC:	0.47%	OTHER:	0.93%

Number of Completed trips: 266
Average Trip Length: 3.3

Idaho Department of Fish and Game
Creel Survey System
Pressure Report by Interval and Daytype
Soucy

Body of Water: SPIRIT LAKE
1992

EPA Rusher:

SECTION	INTERVAL	DAYTYPE	BOAT	BANK	TUBE	ICE	TOTAL	N
1	1	1	PNBLERS	FIRERS	FREERS	PEERS	IOaERS	
			HOURS	HOURS	HOURS	HOURS	HOURS	
1	1	Weekend	5491	598	8	8	6898	
		Weekend	4945	8	8	8	4945	
Interval 1 totals:			18436	598	8	0	11835	
+/- at 95% C.I.:			7804	1197	8	8	7895	
1	2	Weekday	661	8	8	8	661	
		Weekend	3868	227	8	8	4895	
Interval 2 totals:			4529	227	8	8	4756	
+/- at 95% C.I.:			2871	289	8	8	2891	
1	3	Weekday	2830	811	8	8	3642	
		Weekend	2865	126	8	8	2191	
Interval 3			4895	937	8	8	5833	
+/- at 95% C.I.:			1788	744	8	8	1937	
1	4	Weekday	1623	324	8	8	1947	
		Weekend	558	298	8	8	856	
Interval 4			2181	622	8	8	2803	
+/- at 95% C.I.:			1859	395	8	0	1131	
1	5	Weekday	2342	298	8	8	2648	
		Weekend	1917	47	8	8	1964	
Interval 5			4259	345	8	8	4684	
+/- at 95% C.I.:			2568	447	8	0	2599	
1	6	Weekday	2386	8	8	8	2306	
Interval 6			2306	8	8	8	2306	
+/- at 95% C.I.:			1429	8	8	8	1429	
Section 1			28686	2729	8	8	31337	
+/- at 95% C.I.:			8838	1557	8	8	8974	
Season totals:			28686	2729	8	8	31337	
+/- at 95% C.I.:			8838	1557	8	8	8974	

Idaho Deprived of Fish and Sate
Cree1 Survey Systee
Suttary for Catch Rate by Day Type and Interval - for total hours

Body of Water: SPIRIT LAKE

EPA Nuttier:

SECTION I	!	CATCHRATE	CATCHRATE	CATCHRATE	CATCHRATE	CATCHRATE	CATCHRATE	CATCHRATE	CATCHRATE	CATCHRATE	CATCHRATE	CATCHRATE	CATCHRATE
NUMBER	INTEIVPL	DAYTYPE	KEPT 1	RELEASED!	CADENT 1	AD-RBI	:T I CUT 1	KR 1	U@ I	PE	I BC	1 DTNER	
1	1	weekday	6.808	8.808	6.	0.888	8.080	8.888	5.992	0.888		8.8	
		weekend	8.884	8.	8.884	8.088	8.808	8.888	0.759	8.	8.836	0.089	
	2	weekday	3.683	8.171	3.854		8.824	8.	3.585	8 'r,	8.		
		weekend	4.868	8.824	4.884		8.842	8.251	4.149	8.008	8.886		
	3	weekday	1.848	8.545	2.385	8.832	8.811	8821	1.497	8.808	8.843	8.158	8.128
		weekend	2.x^03	0.228	2.423	0.018	8.808	8.2.1 8		8.008	0.880	8.".	8.
	4	weekday	2.758	8.261	3.011	8.811	8.811		2.787	8.811			8.811
		weekend	2.237	8.193	2.430	8.8.			2.237	8.			8.880
	5	weekday	2.390	8.874	2.463	8.'	8.837		2.096		0.	8.	8.129
		weekend	2.674	8.116	2.791	8.893	8.326		2.116		0.000	8.888	8.148
	6	weekday	6.923	8.838	6.962	0.838	8.	0.880	6.885	8.		0.	8.
		weekend	8.008	9.888	L"~	8.028	8.888		8.808	0.808		8.022	8.000
Section 1	weekday	Catchrate:	3.931	8.183	4.114	8.814	0.814	8.004	3.794	8.802	0.287	8.025	0.046
Section 1	weekend	Catchrate:	1.996	8.226	2.222	8.819	8.861	8.842	1.908	8.808	3' 7	8. s s',	8.025
Section 1	season	Catchrate:	3.378	0.195	3.573	8.015	0.827	0.814	3.255	8.801	8.	8.818	8.848
weekday Season	Catchrate:		3.931	8.183	4.114	0.814	8.014	8.884	3.794	8.882	8.007	8.825	8.046
weekend Season	Catchrate:		1.996	0.226	0.370	8.019	8.061	8.842	1.988		8.0.8 8		0.825
Average season	catctrate:		3.378	8.195	3.573	0.815	8.827	8.014		8.801	8.087	8.818	8.048

Idaho Department of Fish and Game
Creel Survey System
Summary for Harvest by Section and Interval - for total hours

Body of Water: SPIRIT LAKE
1992

EPA Number:

SECTION		Interval		Day	PE	FISH	FISH	FISH	AD-RR	RBI	CUT	Ka	LOB	PE	BC	OTTER
MISER		INTERVAL		DAY	PE	KEPT	RELEASED	CUT	KEPT	KEPT	KEPT	KEPT	KEPT	KEPT	KEPT	KEPT
1	Interval	Weekday				36548	49	36589	8	8	8	36491	8	8	8	49
		Weekend				3976	8	3976	0	8	8	3753	8	178	8	45
		1 Totals:				48516	49	48565	8	8	8	48244	8	178	8	94
		+/- at 95% C.I.:				49187	113	49158	8	8	8	49839	8	384	0	147
2	Interval	Weekday				2434	113	2547	8	16		2378	8	8	8	8
		Weekend				16626	3374	28000	8	172		16998	8	25	8	8
		2 Totals:				19068	3487	22547	8	188	1828	19368	8	25	8	8
		+/- at 95% C.I.:				11464	3395	12442	0	267	2150	11552	0	53	8	0
3	Interval	Weekday				6701	1985	8686	117	48	76	5452	A	157	546	466
		Weekend				4827	482	5389	39	8	A	4787	8	A	8	8
		3 Totals:				11528	2467	13995	156	48	76	18239	8	157	546	466
		+/- at 95% C. I.:				8413	3194	9195	222	89	163	8518	0	268	1128	785
4	Interval	Weekday				5354	588	5862	21	21	8	271	21	0	8	21
		Weekend				1915	165	2880	0	8	8	1915	8	8	0	0
		4 Totals:				7269	673	7542	21	21	8	7186	21	8	8	21
		+/- at 95% C.I.:				4741	619	4863	46	44	8	4724	46	8	8	46
5	Interval	Weekday				6318	195	6582	8	98	8	5533	8	8	8	341
		Weekend				5252	228	5482	183	648	8	4156	8	8	8	275
		5 Totals:				11562	423	11984	183	738	8	9689	8	8	8	616
		+/- at 95% C.I.:				9815	496	9949	365	1812	8	9228	8	8	8	
6	Interval	Weekday				15964	88	16854	88	0	8	15877	8	8	8	8
		Weekend				8	8	8	8	8	8	8	A	8	8	8
		6 Totals:				15964	88	16854	88	8	8	15877	8	8	8	8
		+/- at 95% C.I.:				11157	226	11166	134	8	8	11893	8	8	8	8
Section:	1	Totals:				185899	7187	113087	448	987	1184	182595	21	368	546	1197
		+/- at 95% C.I.:				53451	4735	53881	458	1852	2156	53383	46	471	1128	1144
		Season Totals:				185899	7187	113087	448	987	1184	182595	21	368	546	1197
		+/- C.I.:				53451	4735	53881	450	1052	2156	53383	46	471	1128	1144

Appendix K. Jewel Lake - Lake Survey Report.

Jewel Lake - Narrative

Jewel Lake is a 28.6-acre lake located approximately 4.5 miles west of Westmond, Idaho. At its deepest point, Jewel Lake is approximately 33 feet deep. An intermittent outlet stream flows north from Jewel Lake about two miles to the Pend Oreille River. A small inlet stream flows into Jewel Lake from a farm pond located about one mile to the southwest of Jewel Lake. In 1989, Jewel Lake was renovated to remove an unwanted population of yellow perch and was restocked in 1990 with westslope cutthroat and Henrys Lake rainbow x cutthroat trout hybrids. Kokanee salmon were also stocked in Jewel Lake. In 1990, 2,500 fingerling cutthroat trout, 300 adult cutthroat trout, 5,625 rainbow/cutthroat hybrid fingerlings and 3,000 kokanee fry were stocked in Jewel Lake. The 1991 stocking program consisted of 2,500 of fingerling cutthroat, 2,540 hybrid fingerlings, and 3,133 kokanee fry.

The lake is currently managed with special regulation, two fish limit, none under 14 inches in length, and artificial flies and lures, barbless hooks, and no bait. In 1992, we returned to Jewel Lake and conducted a Standard Lowland Lake Survey to assess the success of the program.

Our sampling efforts yielded catches of cutthroat trout, rainbow x cutthroat trout, and yellow perch. A total of 122 cutthroat trout were captured, ranging in size from 5 1/2 inches to 13 1/4 inches with a mean length of approximately 10 inches. A total of 12 rainbow x cutthroat hybrids were sampled, ranging from 10 inches to 14 1/2 inches with a mean length of approximately 11 1/2 inches. We did not capture any kokanee during the survey. An unexpected 61 yellow perch showed up in our gill nets. These fish ranged in size from 5 1/2 inches to 12 1/4 inches.

The presence of the yellow perch in Jewel Lake leads to the question of how they got there. One answer is that during our renovation of the lake all the fish were not killed and the few that remained have reproduced. A second answer is that after the renovation project, someone released yellow perch back into Jewel Lake. Whatever the answer is, it still leaves us with the problem of an unwanted species of fish in Jewel Lake.

During our sampling efforts and subsequent angler interviews on Jewel Lake, the number of legal, 14 inch and larger, trout was exceedingly low. It appears there is a significant compliance problem with the quality trout regulation on Jewel Lake. The use of bait and the harvest of undersize fish from Jewel Lake has reduced the number of larger fish in the system.

With these two problems, yellow perch and lack of regulation compliance, we need to reevaluate our management goals for Jewel Lake. Our options consist of:

1. Maintain the current quality trout management. Open the lake to consumptive harvest in 1994, then treat the lake in 1995. Reopen the lake in 1996 and stock with westslope cutthroat fingerlings and surplus cutthroat and rainbow broodstock. Discontinue stocking of kokanee and rainbow/cutthroat hybrids.

2. Manage the lake as a year round trout only fishery similar to Mirror Lake. Same treatment and restocking schedule as option 1. Maintain the lake with fingerling stocking of cutthroat, brook trout, and rainbow.
3. Manage the lake as a balanced two story fishery. Establish largemouth bass, black crappie, bluegill sunfish and supplement with channel catfish, tiger muskie, and put-and-take rainbow trout. Open to year round fishing.

These options will be presented to anglers at Jewel Lake during the 1993 fishing season and to the public at our fishing regulation review meetings in 1993.

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

FISH COMMUNITY CHARACTERISTICS

LAKE/RESERVOIR NAME: Jewel REGION: 1 DATE: 6/8-9/92

Catch Per Unit* of Combined Gear Sampling Effort 5 units/3 = 1.67

SPECIES	LENGTH - RANGE(mm)	No.	%	Wt. (kg)	%
Cutthroat	140 - 340	73.05	62		
CT/RBT	250 - 370	7.19	6	1.647	
Yellow Perch	140 - 310	36.53	31	6.599	
Brook Trout	420 -	0.60	> 1		
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
GAME FISH SUBTOTAL:		117.37	100		
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
NON-GAME FISH SUBTOTAL:		—	—		
ALL SPECIES TOTAL:		117.37	100%		100%

* one hour electrofishing, one trap net night, and one combined floating and sinking gill net night.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Cutthroat LAKE/RESERVOIR: Jewel

DATE: 6/8-9/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349	0.60	2	415		4+	
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149	0.40	2					440-449						
150-159	1.00	4					450-459						
160-169	1.60	7					460-469						
170-179	0.40	2					470-479						
180-189	0.40	2					480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229	0.20	1					520-529						
230-239	1.00	4	120		2		530-539						
240-249	2.00	8	150		2-3+		540-549						
250-259	6.80	28	160		2-3+		550-559						
260-269	3.60	15	157		2-3+		560-569						
270-279	2.00	8	190		2-3+		570-579						
280-289	0.80	3	210		2-3+		580-589						
290-299	1.00	4	230		4+		590-599						
300-309	1.00	4	220		3+		600-609						
310-319	1.40	6	300		4+		610-619						
320-329	0.20	1					620-629						
330-339							TOTAL	24.4	100				

TOTAL CATCH PER EFFORT OF: GILL NET 60 ELECTROFISHING 62 TRAP NET 0

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CA A COMPOSITION OF: (species) CT/RBT LAKE/RESERVOIR: Jewel

DATE: 6/8-9/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359	0.20	8	420		4+	
60-69							360-369						
70-79							370-379	0.20	8	450		4+	
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259	0.20	8	160		2+		550-559						
260-269	0.20	8	160		2+		560-569						
270-279	0.20	8	~180		~2+		570-579						
280-289	0.60	25	210		2+		580-589						
290-299	0.20	8	210		2+		590-599						
300-309	0.60	25	270		3+		600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	2.40	100	229			

TOTAL CATCH PER EFFORT OF: GILL NET 6 ELECTROFISHING 6 TRAP NET 0

**LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET**

CATCH COMPOSITION OF: (species) Yellow Perch LAKE/RESERVOIR: Jewel

DATE: 6/8-9/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429						
130-139							430-439						
140-149	0.20	2	50	143	1		440-449						
150-159	0.20	2	60	136	1		450-459						
160-169	0.20	2	60	111	1		460-469						
170-179							470-479						
180-189							480-489						
190-199	0.40	3	100	106	2		490-499						
200-209	1.00	8	~130	120			500-509						
210-219	2.80	23	160	123	2		510-519						
220-229	2.80	23	180	119	2		520-529						
230-239	1.80	15	230	131	2		530-539						
240-249	0.40	3	~260	130	2		540-549						
250-259	0.40	3	~300	130			550-559						
260-269	0.40	3	330	127	3		560-569						
270-279							570-579						
280-289	0.20	2	~400	120			580-589						
290-299	0.20	2	~440	120			590-599						
300-309							600-609						
310-319	0.20	2	~550	120			610-619						
320-329							620-629						
330-339							TOTAL	12.2	100	180	124		

TOTAL CATCH PER EFFORT OF: GILL NET 29 ELECTROFISHING 32 TRAP NET 0

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Brook Trout LAKE/RESERVOIR: Jewel Lake

DATE: 6/8-9/92 PERIOD: 1

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ ♀ I/M I/M
							340-349						
50-59							350-359						
60-69							360-369						
70-79							370-379						
80-89							380-389						
90-99							390-399						
100-109							400-409						
110-119							410-419						
120-129							420-429	0.20	100				
130-139							430-439						
140-149							440-449						
150-159							450-459						
160-169							460-469						
170-179							470-479						
180-189							480-489						
190-199							490-499						
200-209							500-509						
210-219							510-519						
220-229							520-529						
230-239							530-539						
240-249							540-549						
250-259							550-559						
260-269							560-569						
270-279							570-579						
280-289							580-589						
290-299							590-599						
300-309							600-609						
310-319							610-619						
320-329							620-629						
330-339							TOTAL	0.20	100				

TOTAL CATCH PER EFFORT OF: GILL NET 1 ELECTROFISHING — TRAP NET —

JOB PERFORMANCE REPORT

State of: Idaho

Name: Regional Fishery Management
Investigations

Project No.: F-71-R-17

Title: Region 1 Lowland Lakes
Investigations: Coeur d'Alene Lake
Investigations

Job No.: 1-b²

Period Covered: July 1, 1992 to June 30, 1993

ABSTRACT

The kokanee Oncorhynchus nerka kennerlyi population estimate in Coeur d'Alene Lake for 1992 was 5.3 million fish. The density of age 3 kokanee was 102 fish/ha. This estimate continued a five year decline.

The mean length of spawning male kokanee in 1992 was 259 mm and 255 mm for females. The mean number of eggs per female was estimated to be 394. The estimated potential egg deposition was 193 million eggs in Coeur d'Alene Lake.

A total of 10,000 fall chinook salmon O. tshawytscha fingerlings were stocked into Coeur d'Alene Lake in 1992. All fish were marked with a right ventral fin clip.

We trapped 180 adult chinook salmon in Wolf Lodge Creek in 1992. Hatchery chinook salmon comprised 62% of the run, and natural chinook salmon comprised 38% of the run.

A total of 63 chinook salmon redds were counted in 1992. Thirty-eight redds were in the Coeur d'Alene River, 21 in the St. Joe River, and 4 redds were found in Lake and Fighting creeks.

Authors:

James A. Davis
Regional Fishery Biologist

Ned Horner
Regional Fishery Manager

INTRODUCTION

Coeur d'Alene Lake is located in north Idaho adjacent to the town of Coeur d'Alene and only 50 km from the major population center of Spokane, Washington. It currently supports approximately 200,000 angler hours, or about 20 h/ha.

Kokanee Oncorhynchus nerka kennerlyi have provided a very popular fishery in Coeur d'Alene Lake since their introduction in 1937. During the peak of the fishery in the late 1970s, 0.5 million fish were harvested, and over 200,000 angler hours were expended. Enhancement of shoreline spawning habitat and the lack of a fish predator led to an overpopulation of kokanee. Length of kokanee declined and the kokanee fishery collapsed. Fall chinook salmon O. tshawytscha were introduced in 1982 to reduce the kokanee population and restore better growth. A very popular trophy fishery on chinook also developed.

Natural reproduction of chinook salmon, in addition to hatchery stocking, has resulted in expansion of the predator population beyond what the kokanee prey base can support on a sustained basis. Continued intensive management of the chinook salmon population and monitoring of kokanee abundance is necessary to maintain the predator-prey balance. The current goal for the program is to provide a limited chinook salmon trophy fishery and a high yield kokanee fishery by controlling the abundance of chinook salmon.

OBJECTIVES

1. To determine kokanee stock status in Coeur d'Alene Lake.
2. To evaluate changes in the kokanee population caused by chinook salmon predation (chinook population abundance).
3. To make predictions about future kokanee fisheries based on year class strength and potential egg deposition.
4. To identify all potential chinook spawning areas in the Coeur d'Alene Lake system.
5. To investigate methods to control chinook salmon abundance.
6. To determine the effects of heavy-metal laden sediments and effluent on the development and survival of chinook salmon eggs and fry in the Coeur d'Alene River below the confluence of the South Fork of the Coeur d'Alene River.

DESCRIPTION OF STUDY AREA

Coeur d'Alene Lake is Idaho's third largest natural lake (Figure 1). It is located in the Spokane River drainage, which ranges in elevation from 648 m (lake level) to 2,086 m. Most of the drainage is covered by coniferous forest. This area receives some of the largest

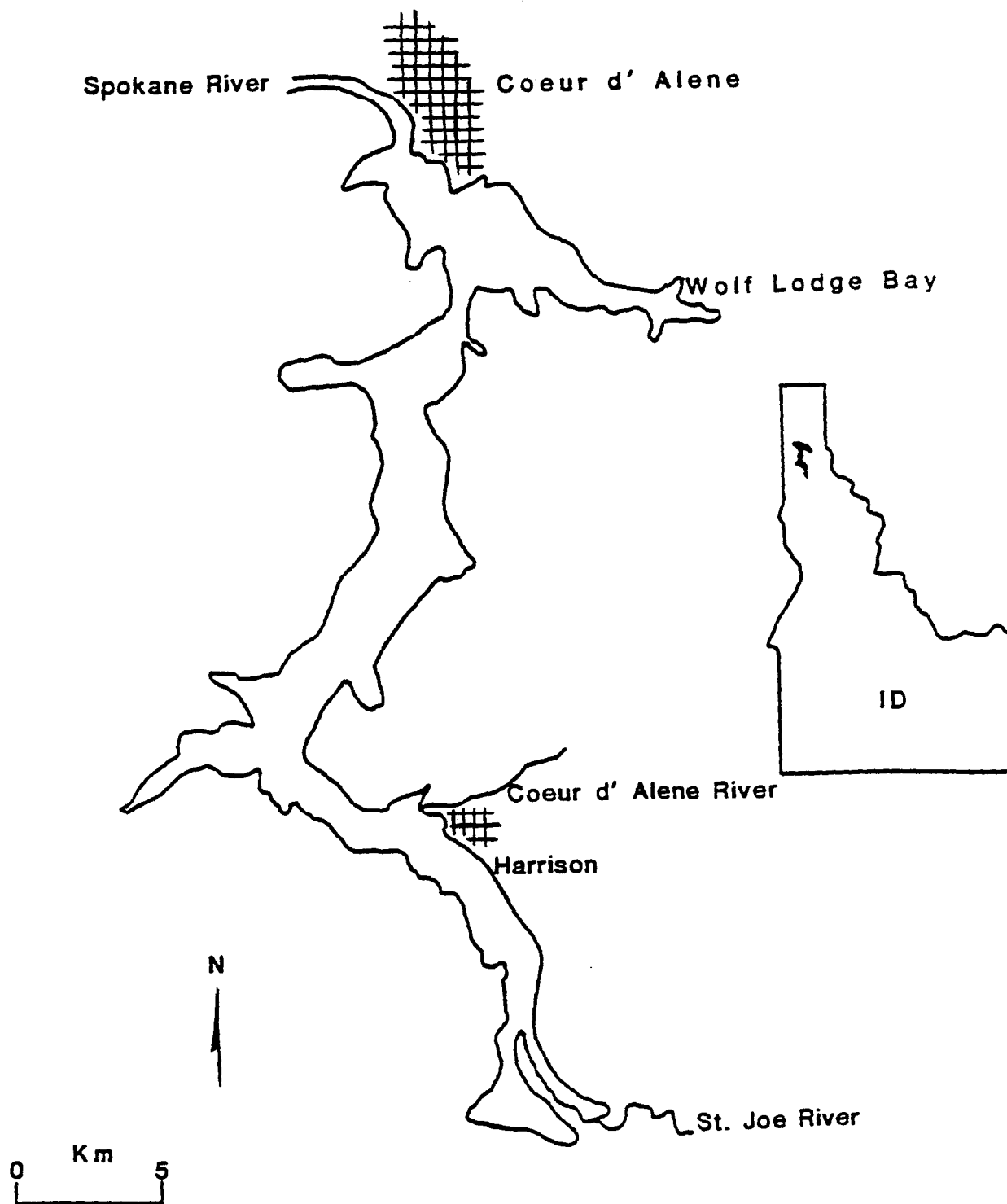


Figure 1. Map of Coeur d'Alene Lake showing the general locations of major tributaries, the lake, and Wolf Lodge Bay.

number of fish stocked during times of low effort or in areas of low demand. The high use times in 1992/ were June to mid-July and late June to July in the North Fork Coeur d'Alene River and Little North Fork Coeur d'Alene River, respectively. The high use areas were campgrounds and areas with large parking capacities. The low use areas were areas with minimal parking capacities.

All the points discussed above can be put together to provide a priority stocking program. In times when enough fish would be available all areas could be stocked. If the number of fish available were reduced, the priority would be:

- 1 . Do not stock section 5 of the North Fork Coeur d'Alene River in August.
2. Do not stock sections 2 and 5 of the North Fork Coeur d'Alene River in August.
3. Do not stock any fish in the Little North Fork Coeur d'Alene River or North Fork Coeur d'Alene River in August.
4. Do not stock any fish in section 5 of the North Fork Coeur d'Alene River.
5. Do not stock any fish in the North Fork Coeur d'Alene River.

RECOMMENDATIONS

1. Reduce the number of fish stocked in the North Fork Coeur d'Alene River to 250 fish/km or 9,825 put-and-take fish.
2. All put-and-take rainbow stocked into rivers should be 250 mm in length.
3. Increase the number of stocked fish in the North Fork Coeur d'Alene River during late June and July.
4. Reduce the number of fish stocked in May or early June and August.
5. Stock all fish for any given year no later than the second week in August.
6. Concentrate stocked fish near campgrounds and reduce stocked fish at low use sites. Increase at sites 7, 8, 10, 11, 14 and 16; reduce at sites 3, 6, 9, 12, 13 and 15 on the North Fork Coeur d'Alene River.
7. In the North Fork Coeur d'Alene River and the Little North Fork Coeur d'Alene River maintain stocking frequency once per week until a proper evaluation has been completed.
8. Reduce the density of put-and-take rainbow trout in the Little North Fork Coeur d'Alene River to 625 fish/km or 3,000 fish annually.

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A P P E N D I C E S
92-DJRPT

Appendix A. Summary of habitat characteristics of put-and-take rainbow stocking sites on the North Fork of the Coeur d'Alene River, Idaho, 1992.

Cover types and
general
description

Stocking site	Habitat type	Length (m)	Mean width (m)	Area (m²)	Depth m	% Substrate						
						Sand	Gravel	Cobble	Boulder	Bedrock		
N rn	1	Pool	150	33	4,950	1.5	0	90	5	5	0	Rock rip-rap along road. No overhead cover. The pool was created by turbulence caused by the rip-rap. The site is a straight section of stream. Access is down a steep bank.
	2	Pool	150	38	5,700	1.9	0		30	30	40	0No overhead cover. A few large rocks and shore line rip-rap was only cover available. The site is located below a bend in the river. and the road is the outside bank. The pool is about 17 m wide. Access is down a steep bank.
	3	Pool	200	53	10,600	1.8	0		70	20	10	0Rip-rap provided only cover. This site is located below a bend in the river and the road is the outside bank. The pool is about 25 m wide. Access is down a steep bank.
	4	Pool	78	32	2,496	10	0		50	30	10	10Deep pool with large boulders as cover. This site is a deep pool with a back eddy created by a bedrock outcrop. Located on a straight stream reach. Access is down steep bank to rock ledge. Camping on opposite bank .
	5	Pool	30	15	450	2.5	0	60	40	0	0	No cover except for turbulence caused by water currents. This site is located at the mouth of Steamboat Creek below the spillway. The pool is separated from the main river by a gravel bar. width of the river was 40 m. Access is down steep bank.

Appendix A. Continued

Stocking site	Habitat type	Length (m)	Mean width (m)	Area (m ²)	Depth m	% Substrate					Cover types and general description
						Sand	Gravel	Cobble	Boulder	Bedrock	
6	Pool	100	292,900		2.5	0	10	80	10	0	Cover consists of some riprap along bank. No overhead cover. This site located on a bend in the river. There is a back eddy pool and the main river flows over a riffle to another pool. Riprap appears to have helped create this pool.
7	Pool	165	916,765		10	0	50	40	10	0	Cover was provided by a few large boulders in the bottom and riprap along the bank. This site was located below a meander along a straight stream reach. There is a gravel bar at the top of the pool that splits the stream. A major camp ground is on the south side of the river and county road 1-C is on the north side of the river. Access is down a steep bank on the north side and easy access from the campground. This was the upper most stocking site in the lower part of the NFCDAR.
						0	0	80	20	0	No overhead cover. Only cover provided by riprap along roadside. This site was located at Jupiter Creek, a 30 day camp site on a straight section of the river. The camp received steady weekend use.
						0	60	25	14	0	Only cover provided by riprap along roadway. This site was located at a turnout near Venus Creek. The river is straight and shallow except near road. The deeper area created by riprap.
8	Glide	110	242,640		.8						
9	Glide	170	315,270		1.2						

Appendix A. Continued

Stocking site	Habitat type	Length (m)	Mean width (m)	Area (m ²)	Depth m	Cover types and general description					
						Sand	Gravel	Cobble	Boulder	Bedrock	
10	Pool	15	10	150	1.5	0	0	30	50	20	Cover provided by large rocks, shade provided by road bridge. The site is on bridge below Kit Price campground. There is a larger pool above this site that is 120m long, 25m wide and 1.4m deep. There is a long riffle (100m) below the stocking site.
11	Riffle	30	17	570	.8		60	40			There is no cover of any type. This is the only access to the river in the Kit Price campground. There is a pool with a mean depth of 1m and an area of 600m ² . Downstream 20m is a long glide that ends in a pool just above stocking site 10. The glide was 100m long, 25m wide and 1m deep. Substrate was cobble and boulder, no cover was present.
12	Pool/Glide	45		1,170	1.3	0	5	5	60	30	A few large rocks provide cover. This site was located at a pullout above Kit Price campground, near Falls Creek. There is a small pool and pull out area. Access is down a steep rocky bank.
13	Pool	162		264,212	1.3	0	20	20	60	0	Cover provided by riprap along bank. This site was located below a curve in the river. Series of small pools. A cover provided by small boulders in stream and riprap .
14	Pool/Glide	160		304,800	2.2	0	30	20	40	0	Large boulders provide cover. This site was a large pool with a long pull out classified as a glide. Access was down a steep bank.

Appendix A. Continued

Stocking site	Habitat type	Length (m)	Mean width (m)	Area (m ²)	Depth m	Cover types and					general description
						Sand	Gravel	Cobble	Boulder	Bedrock	
15	Glide/ Riffle stream.	90	25	2,250	0.51	0	0	80	20	0	Boulders provided the only cover in the stream. This was a poor stocking site but there were pools located 100m downstream and 400m upstream.
16	Pool	200	29	5,800	1.0	0	20	60	10	10	Cover was provided by large rock at upstream end of the pool and at midway in the pool. There were several smaller boulders as well. The site was located at Devil's Elbow campground. A very high use area and was the upper most stocking site. The pool was about 15m wider than the remainder was shallow gravel. The access was gradual incline along streambank.

Appendix B. Summary of habitat characteristics of put-and-take rainbow trout stocking sites on the Little North Fork Coeur d'Alene River, Idaho, 1992.

Stocking site	Habitat type	Length (m)	Mean width (m)	Area (m ²)	Depth m	Cover types and general description					
						Sand	Gravel	Cobble	Boulder	Bedrock	
1	Run/Riffle	10	4	40	.6	0	50	50	0	0	No cover. This is one of the first access sites to the river. There was a small pool upstream about 20 m. It was 25 m long, 18 m wide and .9 m deep. There was a pool about 50 m downstream. It was 80 m long, 15 m wide and 1.5 m deep. This site is close to Bumble Bee campground.
2	Pool	80	19	1,520	4	30	40	10	10	10	Cover was provided by some over-hanging brush and a large rock outcrop. This was the largest and deepest pool in this area of the river. Access was difficult, down a steep bank. Easier access at tail out of pool. Receives heavy fishing pressure because of adjacent improved campground.
3	Glide	100	18	1,800	1.4	0	30	50	20	0	Cover was provided by large boulders. There was a small campground associated with this site. there was a deep channel on the west side of the stream that becomes a shallow to the east.
4	Pool	77	18	1,386	2	0	50	30	15	5	Large rock outcrop and riprap provide cover. A rootwad at the mid-section of the pool also provided cover. The pool was located on a meander and was the second best pool in this section of the river. Access was down a steep bank.
5	Glide/	57	18	1,026	.8	0	70	30	0	0	There was no cover available at this site. This site was located at a 90° turn of the river. There was a small pool located 20 m downstream.

Stocking site	Habitat type	Length (m)	Mean width (m)	Area (m ²)	Depth m	Cover types and general description					
						Sand	Gravel	Cobble	Boulder	Bedrock	
6	Glide Riffle	231	6	1,386	.8	0	20	70	10	0	There was no cover at this site. This was a very long straight glide. Access was down a steep bank.
7	Pool	20	5	100	2.1	0	30	50	20	0	There was one over-hanging bush and one large rock to provide cover. Upstream about 75 m was a large pool created by a debris jam. It was 60 m long, 12 m wide and 3 m deep. There was no road access to this site.

Appendix C. Snorkeling observations of tagged put-and-take rainbow trout in the North Fork of the Coeur d'Alene River, Idaho, 1992.

Stocking site	Stocking date	Number of tagged put-and-take rainbow stocked	Observation date	Number of tagged and untagged put-and-take rainbow observed	Location of observation	
7	6/1	124 Orange tags	6/2	14 orange	Graham Creek campground (stocking site 7)	
			6/5	2 orange	Graham Creek campground	
			6/8	1 No tag	500 m upstream from Graham Creek	
				6/8	8 orange	Graham Creek
	6/18	121 Blue tags	6/18	4 orange	Graham Creek	
				9 blue	Graham Creek	
			6/19	10 orange	Graham Creek	
				26 blues	Graham Creek	
				2 orange	200 m above Graham Creek	
				5 blue	200 m above Graham Creek	
			6/23	7 orange	Graham Creek	
	7/1	3819 blue		Graham Creek No tags		
			7/6	1 orange	Graham Creek	
				1 blue	Graham Creek	
				25 No tags	Graham Creek	
				2 orange	200 m above Graham Creek campground	
5 blue				200 m above Graham Creek campground		
			18 No tags	200 m above Graham Creek campground		
			8/12	1 orange	Graham Creek	
1 blue				Graham Creek		
8 No tags				Graham Creek		

Appendix C. Continued

Stocking site	Stocking date	Number of tagged put-and-take rainbow stocked	Observation date	Number of tagged and untagged put-and-take rainbow observed	Location of observation
16	6/1	124 Blue tags	6/2	40 blue	Devil's Elbow campground
			6/6	19 blue	Devil's Elbow campground
				6 blue	Downey Creek
				3 blue	100 m upstream from Devil's Elbow
	6/18	125 Orange tags	6/8	6 blue	Devil's Elbow campground
				2 No tags	Devil's Elbow campground
			6/18	15 blue	Devil's Elbow campground
				70 orange	Devil's Elbow campground
				3 No tags	Devil's Elbow campground
			6/19	20 blue	Devil's Elbow campground
				50 orange	Devil's Elbow campground
				10 No tags	Devil's Elbow campground
				5 blue	Downey Creek
				6 orange	Downey Creek
				2 No tags	Downey Creek
				2 blue	Yellowdog Creek
			6/24	10 blue	Devil's Elbow campground
				10 blue	Devil's Elbow campground
				29 orange	Devil's Elbow campground
				1 blue	1500 m downstream from Devil's Elbow campground
	7/1	26 No tag	7/6	2 orange	Devil's Elbow campground
				1 blue	Devil's Elbow campground
				17 No tags	Devil's Elbow campground

25 orange

Devil's Elbow campground

1 blue

1500 m downstream from Devil's Elbow campground

Appendix D. Snorkeling observations of tagged put-and-take rainbow trout in the Little North Fork of the Coeur d'Alene River, Idaho, 1992.

Stocking site	Stocking date	Number of tagged put-and-take rainbow stocked	Observation date	Number of tagged and untagged put-and-take rainbow observed	Location of observation
1-6 7	6/1 6/1	36 Red tags 150 Yellow tags	6/6	15 yellow 3 No tags 1 yellow 25 yellow 6 No tags 1 yellow	At stocking site 100 m upstream from site 7 100 m above site 7 at log jam 100 m above site 7 at log jam 100 m downstream from site 7
1-6 1-6 7	6/10 6/17	37 Red tags 32 Red tags	6/18	17 yellow 3 No tags	At stocking site At stocking site
7			6/23	4 yellow tags 2 red tags 3 No tags 5 yellow 4 red tags	At stocking site At stocking site At stocking site 100 m upstream from stocking site 7 at log jam
1-6 1-6 7	6/24 7/1 7/1	27 Red tags 30 Red tags 150 Yellow tags	7/7	13 yellow 5 yellow	100 m upstream from site 7 at log jam At stocking stie 7
1-6 1-6 1-6 1-6 7 1 C	7/8 7/15 7/22 7/29 8/5 o/c	29 Red tags 30 Red tags 30 Red tags 24 Red tags 150 Yellow tags 11 nna +, n e			

Appendix D. Continued

Stocking site	Stocking date	Number of tagged put-and-take rainbow stocked	Observation date	Number of tagged and untagged put- and-take rainbow observed	Location of observation
			8/11	3 yellow 2 No tag 3 yellow	At log jam At log jam At stocking site
1-6	8/12	37			
1-6	8/19	35			
1-6	8/26	19			

JOB PERFORMANCE REPORT

State of: Idaho

Name: Regional Fishery Management
Investigations

Project No.: F-71-R-17

Title: Region 1 Technical Guidance

Job No.: 1-d

Period Covered: July 1, 1992 to June 30, 1993

ABSTRACT

Region 1 fisheries management personnel provided private individuals, organizations, and state and federal agencies with technical review and advice on various projects and activities that affect the fishery resources in northern Idaho. Technical guidance also included numerous angler informational meetings, presentations, and letters, development of informational brochures and fishing clinics.

Authors:

Ned Horner
Regional Fishery Manager

Lance Nelson
Regional Fishery Biologist

OBJECTIVES

1. To furnish technical assistance, advice, and comments to other agencies, organizations or individuals regarding projects that affect fishery resources in northern Idaho.
2. To promote the understanding of fish biology and fish habitat needs and the ethical use of the fishery resource through individual contact, club meetings, public presentations, informational brochures, and fishing clinics.

METHODS

Regional fisheries management personnel provided both written and oral technical guidance.

RESULTS

The technical guidance provided by Region 1 fish management personnel focused on activities that directly affected fishery resources or resource users in north Idaho. Most of the habitat related issues handled in the past were being addressed by a staff position under the Natural Resources Policy Bureau of the Idaho Department of Fish and Game.

Numerous presentations and programs were made to civic and sportsmen's groups throughout the year. Letters were sent to numerous individuals and organizations in response to specific questions about the fisheries in north Idaho.

Fishing Clinics

Regional fishery management personnel coordinated four Free Fishing Day fishing clinics in the region. Department-sponsored clinics were held in Coeur d'Alene, Mullan, Bonners Ferry, and Round Lake State Park. We also provided fish and guidance for clinics at Priest Lake and St. Maries sponsored by the U.S. Forest Service. The clinics were geared toward teaching young anglers how to fish (casting, baiting hooks, etc.), fish identification, the reasons for regulations, fishing ethics, and how to clean fish. The emphasis was on education and not competition. Numerous regional personnel, people from other state and federal agencies, and sportsmen groups assisted in making the clinics a big success.

Informational Brochures

The Regional Fisheries Manager developed two informational brochures with assistance from the Information and Education Bureau. A brochure for the Spokane River drainage attempts to explain the complex regulations intended to manage for wild native trout in this

watershed. It encompasses the Coeur d'Alene, St. Joe, and St. Maries rivers, all of Coeur d'Alene Lake, and the upper Spokane River in a color-coded map corresponding to the various regulations. A narrative portion on the reverse side explains the reasons for specific size limits, bag or season restrictions, and talks about the reasons for the emphasis on wild trout. Another less complex brochure was developed for the Moyie River and surrounding lowland lakes.

Kootenai River Sturgeon

Kootenai River white sturgeon Acipenser transmontanus were petitioned to be listed under the Endangered Species Act in June of 1992. The Libby Dam, built by the Corps of Engineers in 1972, has regulated the Kootenai River for power production and flood control. The last evidence of successful reproduction of sturgeon occurred in 1974. It is believed that the combination of factors (reduced flows, power peaking, declines in river productivity, and changes in temperature) caused by regulating the river are the direct cause for the lack of successful reproduction. Other species like burbot Lota lota, rainbow trout and whitefish have also declined in the Idaho portion of the river.

A Technical Committee of sturgeon biologists and flow experts was formed to develop a plan that would lead to the recovery of sturgeon without the need for listing. The Regional Fisheries Manager facilitated seven meetings of the committee between July 1992 and March 1993.

The Technical Committee did develop a plan that would provide a good chance to achieve successful sturgeon spawning and recruitment, while minimizing impacts to upstream fisheries and downstream flooding. The basic element of this "best case" scenario was a flow of 35,000 cfs for 40 days from mid-May to mid-July. Load following (peaking) would be eliminated or held to what occurred naturally. The combination of flow and other conditions that may create successful reproductive conditions for sturgeon less than the "ideal" 35,000 cfs plan would need to be tested. Flows below 20,000 cfs in the period from 1972 to 1992 have not worked.

Unfortunately, the Corps of Engineers existing project authorization for Libby Dam and flood control treaties (some with Canada) plus Bonneville Power Administration power contracts will not allow a significant change in river conditions that have occurred during the last 20 years. The wide difference between what the sturgeon need to reproduce successfully and what the Corps of Engineers and Bonneville Power Administration are willing to provide make listing under the Endangered Species Act very likely.

Wolf Lodge Creek

Wolf Lodge Creek is one of the few remaining tributaries to Coeur d'Alene Lake producing significant numbers of wild adfluvial westslope cutthroat Oncorhynchus clarki lewisi trout for the fishery in the lake. The rupture of a high pressure petroleum pipeline on June 4; 1983 resulted in the spilling of 25,000 gallons of gasoline and sterilization of the lower five miles of the stream. The settlement with the pipeline company provided mitigation funds to

address a host of habitat-related problems in the lower watershed that is under private ownership. After many years of working with private landowners, state and federal agencies, two pipeline companies, private consultants, and construction contractors, the bulk of the Wolf Lodge/Marie Creek stream channel restoration project was completed in February of 1993.

The project involved a combination of reestablishing the capacity of the channel to carry water by removing excess bedload gravel, constructing sediment traps to maintain channel capacity, and constructing rock and tree structures to protect vulnerable banks while creating deep holes for rearing cutthroat.

Additional work will be needed to improve the stability of the stream banks and enhance fish habitat. We will continue to work with landowners, volunteers, and other agency personnel to rehabilitate degraded stream banks by intensive riparian planting and control of livestock grazing with fences and watering sites away from the stream banks.

Hoodoo Creek

Hoodoo Creek is a low gradient spring-fed stream that originates close to Kelso Lake and flows approximately 22 km west and north into the Pend Oreille River. Due to past land management practices such as grazing of livestock and the dredging and straightening of Hoodoo Creek by the Corp of Engineers to drain surrounding agriculture land, Hoodoo Creek is heavily impacted by silt. Currently there is only one major source of livestock impact, a dairy farm located approximately 1.6 km southwest of Vay. Riparian vegetation is lacking along the majority of stream reach. High summertime stream temperatures, nutrient loading, and the lack of scouring spring runoff have encouraged the prolific growth of aquatic vegetation. This aquatic growth has added to the imbedded nature of the stream bottom as it dies and decomposes.

Electrofishing efforts in Hoodoo Creek in 1983 (Horner and Rieman 1984) yielded rainbow trout O. mykiss, cutthroat trout O. clarki, rainbow x cutthroat hybrids, brook trout Salvelinus fontinalis, and brown trout Salmo trutta ranging from 50 mm to 410 mm. Other species included mountain whitefish Prosopium williamsoni, largescale sucker Catostomus macrocheilus, longnose dace Rhinichthys cataractae, yellow perch Perca flavescens, tench Tinca Tnca, and slimy sculpin Cottus cognatus. Brown trout have been stocked in Hoodoo Creek since 1981. Current fish densities in Hoodoo Creek are unknown. There is some evidence that brown trout and rainbow trout spawn in the lower kilometer of Hoodoo Creek with limited success. The stream offers little other spawning substrate and the brown trout population is maintained by stocking fingerlings.

As identified in 1991 (Horner et al., in progress), the most beneficial activity for Hoodoo Creek is to enhance the riparian habitat along the stream course. A short section of Hoodoo Creek was planted with riparian vegetation in 1992.

A section of Hoodoo Creek approximately 2.0 km in length, located 3.2 km upstream from the Pend Oreille River and 1.0 km east of Vay, was selected for riparian restoration. The cooperating land owner, Harry Kenney, had placed the ground in the land bank. The dominant

riparian vegetation along the Mr. Kenney's section of Hoodoo Creek consisted of Reeds canary grass with several thorn apple trees growing next to the stream.

Willow cuttings were obtained from the Coeur d'Alene River drainage by Idaho Fish and Game reservists and volunteers, and hybrid poplars were donated by the University of Idaho County Extension Agency. On March 28, 1992, with assistance from the Bonner County Sportsman Association, we planted several thousand willow and poplar cuttings along the 1.0 km stream reach.

Both willow and poplar growth was observed during a mid-summer visit to the Hoodoo Creek site. A second inspection of the site was made in late November 1992. Some beaver damage to the plantings was observed. One of the adjacent land owners, Ron Winship, had a trapper in the area to remove the beaver that were also causing damage to trees on his property. Beaver removal should be done prior to any future planting. The spring and summer of 1993 will show if the willow and poplar cuttings were successful. We hope this effort will encourage other landowners to cooperate with riparian enhancement that will ultimately improve the fishery.

It is necessary to include the Regional Land Owner/Sportsmen Coordinator and the Regional HIP Biologists in this program. In the future it will be their contacts with other landowners along Hoodoo Creek that will lead to more riparian rehabilitation.

System Operation Review

The U.S. Army Corps of Engineers began a comprehensive review of the regional hydropower system in 1992 called the System Operation Review. Increased demand for power, changes in Canadian treaties, and resident and anadromous fishery issues mandated this review.

The two federal projects affecting north Idaho fisheries are the Libby Dam in Montana, who's impact on the Kootenai River has already been discussed, and the Albeni Falls project on the Pend Oreille River. The Albeni Falls Dam was constructed in 1952-53 and regulates the level of the Pend Oreille River and Pend Oreille Lake 3.5 m from summer to winter.

Principle Research Biologist, Melo Maiolie, investigated the impact of winter drawdown on shoreline spawning kokanee and concluded that the major decline in wild shoreline spawning stocks could be attributed primarily to the level of drawdown and not just the fluctuation during drawdown.

At the same time, a graduate student funded by the Idaho Department of Fish and Game documented that the lack of a warmwater sport fishery on the Pend Oreille River was the direct result of the same 3.5 m winter drawdown. Non-game species of fish and small yellow perch dominated the fishery in Idaho. A significant sport fishery for bass, crappie and perch existed in the Box Canyon reservoir downstream of Albeni Falls Dam where the annual drawdown is less than four feet.

The communities around Lake Pend Oreille also became aware of the recreational benefits of managing the lake more like the unique natural lake that it is rather than a

drawdown reservoir. With technical data provided by Fish and Game personnel, the public has provided both overwhelming and consistent support for managing the lake differently. Proposals being considered include reducing winter drawdown from 11.5 feet to about 5.5 feet on a frequent enough basis to achieve successful shoreline spawning of kokanee. The Regional Fishery Manager provided written comments to the Corps of Engineers. The System Operation Review process will continue to work towards changes in water level management that will benefit the fishery resources of this unique system.

Miscellaneous

The Regional Fishery Manager provided input on information requests for bull trout as related to the petition to list bull trout under the Endangered Species Act. The Coeur d'Alene Indian Tribes proposal for fishing enhancement efforts on tributaries to Coeur d'Alene Lake were reviewed and commented on. Several coordination meetings were held with hatchery, research, and enforcement personnel to insure management goals were achieved. Several minor fish kills were addressed. Data on the sport fishery of Lake Pend Oreille was submitted to the Outfitters and Guides Board to be considered in resolving the issue of how many fishing guides is enough on the big north Idaho lakes.

LITERATURE CITED

Horner, N.J., and B.E. Rieman. 1984. Regional Fishery Management Investigations, Idaho Department of Fish and Game. Federal Aid to Fish and Wildlife Restoration. F-71-R-9. Job Performance Report. Boise.

Submitted by:

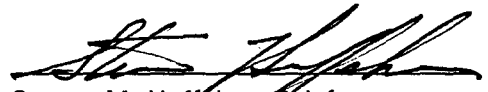
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IDAHO DEPARTMENT OF FISH AND GAME

A handwritten signature in black ink, appearing to read "Steve Huffaker", written over a horizontal line.

Steven M. Huffaker, Chief
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A handwritten signature in black ink, appearing to read "Bill Hutchinson", written over a horizontal line.

Bill Hutchinson
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